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THE ANATOMY OF PAIN

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THIS STUDY IS AN ATTEMPT to summarise the available information concerning the structure of the sensory mechanism mediating pain, and to indicate how this information has proven useful in its interpretation and treatment.

In proceeding to a description of the pain mechanism it is implied that pain is an independent sensation. That is, that it has its own sense organ, its own peripheral nerve fibres and its own central pathways. It is proposed to deal with each of these parts in turn.

THE PAIN SENSE ORGAN

The recognition of pain as an independent sensation was established when its own sense organ was successfully isolated and studied by Woollard and Weddell. In the field of a regenerating nerve these men located an area of skin which was sensitive only to pain. This was excised and found to contain an unmyelinated nerve fibre which passed into the superficial layer of the dermis and there, in a plane parallel to the surface, formed a discrete, closely woven network. The only evidence of specialisation in this network was the presence of local thickenings, and twig-like branches that ended in little knobs and loops. A feature of this terminal nerve-net was its relatively large size. Its diameter was observed to be 1.5 mm. in the pad of the thumb and 7.5 mm. on the back of the hand. Actually Tower would prefer to look upon this terminal nerve-net not as one sense organ but as a collection of sense organs in as much as she was able to show that adaptation to a stimulus was limited precisely to that part of the network that was stimulated. She therefore proposed the term neurosensory unit for the sensory fibre and all its endings. This term is particularly applicable in as much as a single pain fibre has been found to supply up to 6 sq. cm. within the viscera of a frog.

The discovery that a single fibre supplies a much larger area than previously suspected, led Tower to believe that it might supply even larger areas than the present anatomical techniques could reveal. Hence she suggested that a clue to the largest size of the terminal distributions of a pain fibre might be obtained from Lewis' studies of skin hyperalgesia (increased pain sensitivity). Lewis showed that the skin around an area of skin crushed in a forceps soon became

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hypersensitive to pin prick. He also was able to show that under the conditions of his experiments, the increased sensitivity of the skin was due to its bombardment with nerve impulses that had travelled from the end of one branch of a nerve fibre in the injured area, to the end of another branch of the same fibre in the surrounding skin. Since the spread of hyperalgesia was such as to require that the ends of two branches of a single nerve fibre be 12 cm. apart, and since he thought the localising of stimuli depended on a one-point-one-nerve-fibre arrangement, he decided that pain fibres could not be involved. He therefore postulated the existence of a new set of nerve fibres and called them nocifensor fibres. Anatomical studies have failed, however, to reveal them, and have provided evidence that localisation is not only possible but actually requires the presence of overlapping sense organs (see below). Hence the objection to the belief that pain fibres may be involved in the spread of the hyperalgesia described by Lewis no longer exists, and therefore, as Tower suggests, it is possible to use the observations on the maximum spread of hyperalgesia to gauge the extent of distribution of a single fibre. On the basis of this reasoning Lewis' results indicate that a single nerve fibre may supply an area of skin up to 12 cm. in diameter.

In normal skin the nerve-nets of adjacent fibres not only overlap but are so intimately interwoven that stimulation of one nerve fibre would be impossible. Hence it has been suggested that localisation is not a peripheral but a central phenomenon. To illustrate, in localising a pin prick the central nervous system receives trains of impulses through at least three nerve fibres, each with its own frequency and duration (determined for each fibre by the part of the nerve-net stimulated). On the basis of the pattern of these impulses and with the aid of other senses the central nervous system 'learns' by experience to project the source of the stimulus to a certain point at the periphery. It is as if the central nervous system provided itself, in the early years of life, with a map of the body and that localisation thereafter was possible by reference to that map. Such a conception would explain the inability to localise pain in deep structures such as the diaphragm, heart, or ureter. The chief pain produced by stimulation of these three structures is felt at a point widely separated from them, and is called a referred pain. This will be discussed later. For the present let us draw attention to another aspect of the problem of deep pain, namely its extreme unpleasantness.

It is well known that injury to the skin is felt as a sharp localised pain that raises the blood pressure and excites activity to ward off or escape from the cause of the pain. This is designated superficial pain. It is in direct contrast to the deep, aching, weakening pain produced by compression of a tendon, or a blow to the groin or kidney region. These two pains being so different were believed to be mediated by two pain pathways, but there is as yet no anatomical evidence for this. The only indication of a structural basis for the difference in the two pains is the work of Weddell. He has recently brought forward evidence to suggest that the difference is related to a decrease in the number of pain endings per unit area in deep as compared to superficial structures. As an indication of the relationship he first points out that during the time when a severed cutaneous nerve is regenerating, there is a period when the response to pin prick is abnormally unpleasant. Head called this protopathic

sensation. Histologically at this stage the pain endings are few in number and significantly, he says, isolated from one another. When regeneration is complete, and pain endings extensively overlap once again, the unpleasant quality is lost. This relationship of unpleasantness and reduced nerve supply is suggested also by an experiment of Livingston who succeeded in making the response to pin prick peculiarly unpleasant in an area of normally innervated skin by blocking successively more and more of the nerves that supplied it. Weddell also points out that the nerve endings in deep structures, which characteristically give rise to unpleasant pain responses, are similar to those found in skin which has only partially recovered its nerve supply. That is, they are few in number, and tend to be discrete. In addition, they tend to supply somewhat larger areas than the nerve terminals in skin. These findings not only offer an anatomical basis for variations in pain quality but they also suggest another reason for a difficulty in localising deep pain stimuli. That is, there is a lack of overlap of peripheral nerve endings, a condition which deprives the central nervous system of the ability to glean the information it requires.

It is of interest that the skin is dotted with points that are particularly sensitive to pain. These are known as pain spots and their incidence varies from 200 per sq. cm. in the proximal part of a limb to 40 per sq. cm. in the distal part. Their incidence is apparently not related to two point discrimination in as much as this ability to discriminate is best developed in the distal part of the limbs. Figures reveal that two points of contact to be recognised as two stimuli must be at least 10 mm. apart on the forearm, 5 mm. apart on the palm and 1 mm. apart on the finger pad. Bishop studied the structure of the pain spots in the skin of his forearm. He showed that each pain spot lay superficial to the point where a bundle of nerve fibres pierced the dermis before dispersing in the plane of the superficial layer of nerve endings. There is according to this conception a higher concentration of nerve endings and therefore relatively greater sensitivity at the point of dispersal of nerve fibres into the superficial skin plexus.

Finally, it is of interest to explain certain observations that would appear to contradict the belief that pain is excited only by the stimulation of pain sense organs. Thus, there is the observation that a so-called cold spot on the skin containing cold receptors, end bulbs of Krause, will respond to excessive stimulation with a sensation of pain. Anatomical studies now provide the answer. An end bulb of Krause contains an accessory fine unmyelinated fibre which possesses the characteristics of a pain ending. It is this fibre that functions as a guard against tissue injury and is responsible for the pain from excessive cold. Similar pain fibres have been discovered within other encapsulated end organs. In the case of the retina, although excessive light may be painful, there is no evidence it contains pain fibres. The pain excited by very bright light would appear to be due to the stimulation of the nerve endings of the trigeminal nerve which are found in the iris and ciliary body. These endings are stimulated by the movement of the iris in reflex constriction of the pupil due to the light. Certainly in diseased eyes with an inflamed iris it is possible to relieve the pain produced by bright light by paralysing the constrictor of the pupil.

PERIPHERAL NERVE FIBRES

There are two kinds of pain fibres in peripheral nerves, unmyelinated and myelinated, with conduction rates of two meters and 20 meters per second respectively. They are both found in cutaneous nerves, but the fast conducting fibres are the ones that extend superficially into the deeper layers of the epidermis. Thus, on pricking the skin of the finger just proximal to the nail bed, there is an immediate sharp pain which passes off to be followed by a second pain a moment later. The quality of the pain is the same in both cases. The time interval is equivalent to the difference in conduction times from the periphery to the central nervous system. By using very fine needles that penetrate the skin it is possible by carefully controlling the depth of penetration to stimulate the endings of the two kinds of fibres independently. It is of interest that the skin of the back and of the abdomen are supplied only with the slow pain fibres with a consequent delay in the response to pain stimuli. Also, in certain cases of tabes there is a noticeable delay in the response to pain stimuli which may be explained by the selective loss of function of the fast conducting group of fibres.

Pain fibres are fortunately more sensitive to cocaine than fibres of all other categories. That is, when a mixed nerve is treated with cocaine, or any other anaesthetic, pain fibres are first to lose their ability to conduct impulses. This peculiar sensitivity and the variation in the sensitivity within the remaining categories of peripheral nerve fibres was explained when Gasser showed that sensitivity to an anaesthetic is inversely proportional to the diameter of the nerve fibre and that, on the average, motor and proprioceptive fibres have the largest diameter, touch and temperature are intermediate in size, and pain are the smallest. Similar studies have shown that the sensitivity of nerve fibres to asphyxia is the reverse of that to cocaine. This serves to explain the association of a feeling of numbness (loss of touch sensation) and pins and needles (retention of pain sensation) in a limb that has partly 'fallen asleep'.

The pain fibres do not form a separate bundle in peripheral nerves or dorsal roots. It is only as they are about to enter the spinal cord that the pain fibres are segregated and form a lateral bundle. Here they have been sectioned in cats to eliminate the changes in blood pressure and respiration which experience has shown are associated with pain stimuli. Except for this one point at the attachment of the sensory roots to the central nervous system the pain nerve fibres are diffusely mixed with other sensory fibres. To illustrate how diffusely the pain fibres are arranged in a peripheral nerve it may be pointed out that in cutting the sensory root of the trigeminal, to give relief in trigeminal neuralgia, it is possible to preserve enough of the fibres from the cornea and conjunctiva to save the blink reflex if any single bundle is left intact. It is significant that the pain fibres of one dorsal root reach the skin of the segment immediately above and below, but they do not spread out as widely as touch fibres. Hence the area of loss of pain following a section of two or more roots is always greater than that for touch. Section of one root produces little, if any, loss of pain. As the fibres of a dorsal root continue toward the periphery and reach cutaneous nerves it is found that the pain fibres now extend beyond the touch fibres in any given nerve. This difference in spread is great-

est in the proximal part of an extremity and minimal in the fingers.

Another feature of the course of pain fibres in peripheral nerves is their failure to take direct routes to their destination. Weddell was able to trace the whole course of the fibres supplying the large skin surface of the rabbit's ear and made the interesting discovery that fibres changed direction repeatedly within nerve bundles and travelled roundabout routes to such an extent that the fibres passing to the middle of an area supplied by a given nerve could have the longest distance to travel. That is, they would have to extend to, and then return from, the periphery of the field which that nerve was supplying. This explains the relatively little sensory loss which follows a cut in the skin and it also explains why the central part of the area supplied by a sectioned and sutured skin nerve may be the last to recover.

Let us turn to a consideration of the course and distribution of fibres passing to the structures deep to the skin. It is perhaps not widely known that the skin and the tissues deep to the skin such as fasciae and muscles are commonly supplied by nerves from different segments. For example, the part of the serratus anterior supplied by the seventh cervical segment is inserted into the inferior angle of the scapula where it lies deep to the skin supplied by the sixth thoracic segment. Hence a pain resulting from irritation of the pain fibres of the dorsal root of the seventh cervical nerve may give rise to pain felt at the inferior angle of the scapula. It is suggested on the basis of symptomology that the distribution of fibres to the deeper tissues (sclerotomes) is more nearly that found in the embryo than is the distribution to the skin (dermatomes). For example, the sensory fibres of C7 are believed to continue to supply bone and fascia along a narrow band extending out into the upper limb from the lateral border of the scapula, along the dorsal and lateral surfaces of the humerus, the approximated borders of the radius and ulna, and the second and third fingers, whereas the 7th cervical dermatome is limited to the distal part of the limb (Brodal, p. 150). The fibres to the sclerotome in this particular case could reach their destination via direct branches from the main nerve trunks (radial, median and ulnar) and from motor nerves of which the terminal branch of the posterior interosseous nerve is a good example.

The pain fibres of the viscera have the same characteristics as the somatic sensory fibres and, contrary to a somewhat popular opinion, are not a part of the autonomic nervous system. Their only association with the efferents of the autonomic system is that of fellow traveller. Thus, pain fibres of the heart pass through the sympathetic trunk to thoracic segments 1 to 5. Pain fibres of the abdominal part of the alimentary tract, except for the lower part of the colon, course in the thoracic splanchnics to the lower six thoracic segments, and from the pelvic viscera, including the lower part of the colon, the pain fibres course in the pelvic splanchnics to reach sacral segments 2, 3 and 4.

CENTRAL PATHWAYS

The pathway leading from the pain sense organ to the cerebral cortex is essentially a chain of three neurons. The first neuron has its cell body in the ganglion on the sensory root of the nerve in question, e.g., for the spinal nerves in a dorsal root ganglion, and for the cranial nerves in a ganglion such as the trigeminal. The cell body of the second neuron is contained in the central nervous system

at the same segmental level as the cell body of the first neuron, whereas the cell body of the third neuron is in the thalamus. Hence, the axons of the secondary neurons form the long ascending fibre tract found in the cord and brain stem.

Within the central nervous system the pain fibres, in contrast to those in peripheral nerves, do not mingle with those of other sensory types but rather tend to form bundles that can be cutwithout impairing other sensations. In the spinal cord this segregation begins at the attachment of the dorsal root, the small pain fibres segregating themselves to form its lateral portion. When these are sectioned in animals pain reflexes are eliminated and proprioceptive reflexes are preserved. Cutting this part of the pain pathway in spinal nerves to relieve pain is not, however, a practical procedure. Technical difficulties prevent it, and, moreover, the fibres of at least three segments would have to be cut to obtain analgesia (loss of pain sensation) in a given segment. In the head region, however, the circumstances are more favourable to surgical intervention. In the first place, the central processes of almost all the primary sensory neurons are contained in one large sensory root, that of the trigeminal nerve. Secondly, the pain fibres of this nerve that form the bundle corresponding to the lateral portion of a spinal nerve are quite long. (The ophthalmic fibres are the longest and the man-

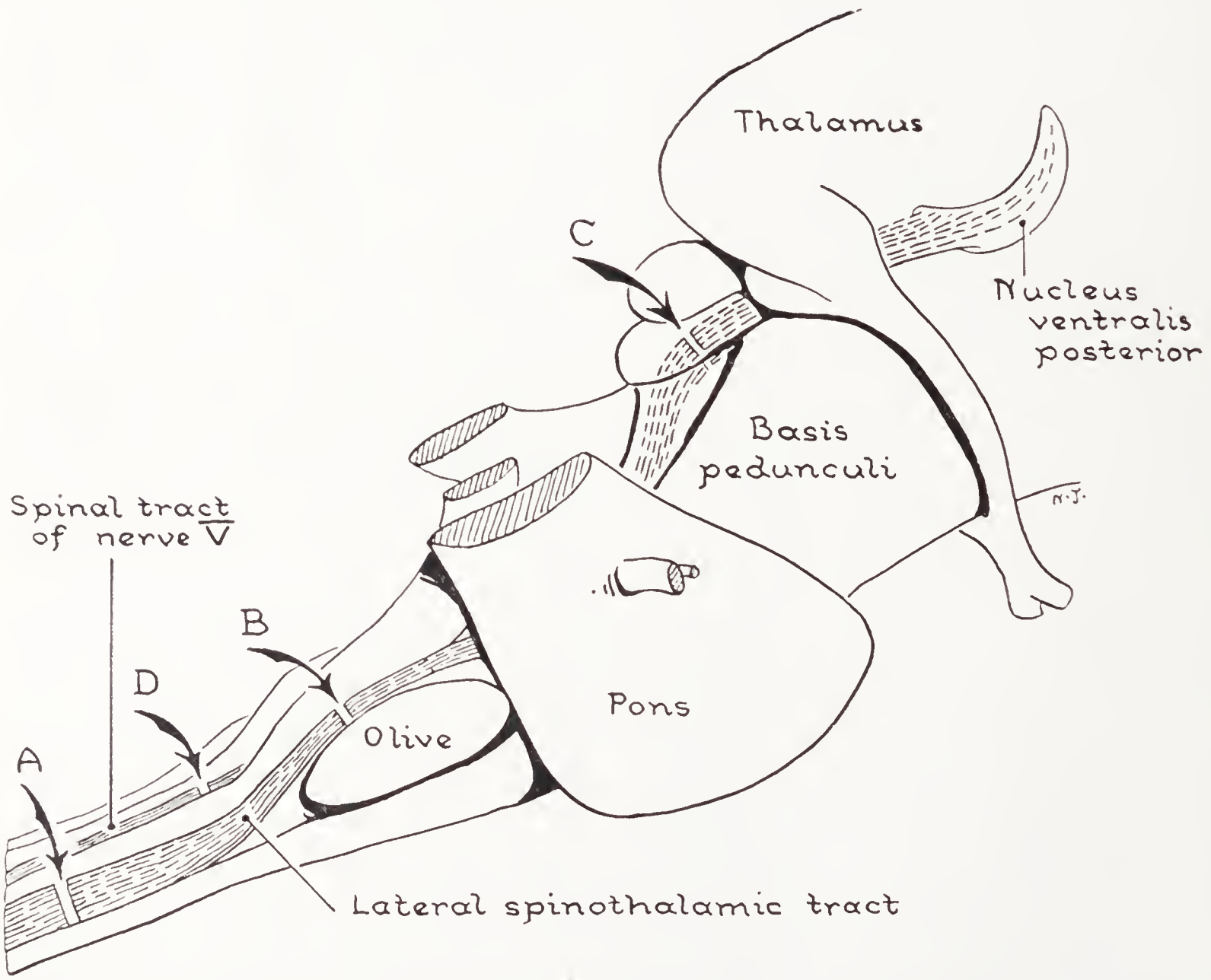

FIG. 1.—Lateral aspect of the brain stem and the first cervical segment of the spinal cord showing the pain tracts. The arrows *A*, *B*, and *C* locate the sites where the lateral spinothalamic tract may be sectioned. Arrow *D* locates the site where the spinal tract of the fifth nerve may be sectioned.

dibular the shortest). They are long because they have to descend to the lower end of the medulla to reach their secondary neurons. Thirdly, this descending bundle, known as the spinal tract of the fifth nerve, is compact and it conveniently comes to the surface of the medulla below the level of the olive (fig. 1). Hence it may be cut to relieve pain on the same side of the head.

The cell bodies of the secondary neurons of the spinal cord are located in the dorsal horn. Those of the brain in the nucleus of the spinal tract of the fifth nerve. The axons of these cells cross the midline at once, coursing transversely within their segments of origin, and then ascend. In the spinal cord these fibres form the lateral spinothalamic tract (fig. 1), which is a diffuse bundle in the lateral funiculus between the grey matter of the anterior horn and the surface of the cord. The fibres coming from the lowest segments are near the lateral surface of the cord; those from higher levels are located progressively more medially. Hence, in order to sever the medial fibres that have just crossed the midline a knife would have to penetrate to the grey matter of the anterior horn. The failure to appreciate this explains why secondary fibres were formerly believed to ascend several segments before crossing. It is interesting that section of the lateral spinothalamic tract will relieve visceral pain, as well as somatic, but because of the bilateral innervation of midline viscera it is usually necessary to section the tract bilaterally.

The lateral spinothalamic tract progressively adds to its content of fibres as it ascends, but it only becomes compact when it reaches the medulla. Here it lies superficially just behind the olive and may be severed by a knife-cut three or four millimeters deep, but it is difficult to reach because the vertebral artery is in the way. In the pons it is quite deep, but at the level of the midbrain it is again on the surface. In this region it courses within the ribbon of ascending auditory fibres called the lateral lemniscus. These auditory fibres produce a longitudinal elevation which betrays the position of the pain fibres. Since the auditory fibres of one side can be cut without producing deafness, on either side, and since the pain fibres of the head region have already joined the tract it is possible to produce analgesia (loss of pain sensation) in the whole of the opposite half of the body by a section here, just 5 mm. deep.

Above the level of the midbrain the pain fibres tend to form a less compact bundle and mingle with the other general sensory fibres of the medial lemniscus which shifts laterally to engulf them. Within the medial lemniscus its fibres ascend to end diffusely in all parts of the nucleus ventralis posterior of the thalamus. There is, however, a topographical arrangement of the fibres such that those from the head reach the medial part of the nucleus and the leg fibres its lateral part. There is no grouping of the cells of the nucleus according to function, and anatomically it would appear that all modalities of cutaneous sensation are equally relayed to the postcentral gyrus. Structurally, then, there does not appear to be an explanation for the selective preservation of pain sensation following extensive lesions of the cerebral cortex. Moreover, studies of the thalamic nuclei and their connections have not yet revealed the mechanism of the intolerable spontaneous pain in the opposite side of the body that may occur with lesions of the lateral portion of the thalamus. A possible explanation is that it results from the partial interruption of

pain impulses arriving at the thalamus and thus to a disturbance of the normal pattern of excitation in the higher centres of the brain (Clark). This explanation is suggested by the observation that the quality of the pain response is altered in the direction of unpleasantness by a reduction in the number of functioning nerve fibres in peripheral nerves as dealt with earlier in this study.

It is quite obvious from the foregoing remarks that there is a great deal to be learned concerning the pain mechanisms of the forebrain. This is particularly evident in view of the amazing success of the most recent attack on intractable pain, namely, unilateral sectioning of the anterior thalamic radiations, that is, the fibres passing between the frontal cortex and thalamus. This remarkable operation appears to be effective on either the right or left side regardless of the side of the pain and without producing analgesia such as follows the sectioning of the lateral spinothalamic tract. This operation has been looked upon as altering the reaction to pain in the same way as the excitement of combat does, that is, it induces a similar indifference to pain-producing stimuli.

In conclusion it is important to stress the interrelation of the chains of neurons that form the pain pathway. Far from being independent of one another, as illustrated in the upper part of figure 1, they are intimately related through collaterals and connecting neurons. This is not an arrangement peculiar to the pain pathway, where sensations are not uncommonly very poorly localised, but even in such a precise mechanism as the visual system.

In the case of the pain mechanism the interconnecting cells and fibres may have to extend a relatively long distance to connect the chains of neurons that are excited by a localised stimulus. For example, the pain fibres stimulated by a pin prick may enter the spinal cord in the dorsal roots of three segments. These will necessarily be interconnected to make localisation of the stimulus possible and it may be that the dorsolateral fasciculus (Tract of Lissauer) serves to connect them. It is not difficult to understand how such a central mechanism could account for the observation that a pain, correctly localised initially, may, if continued, be felt in a wide area. An example of this is illustrated by the following experiment. If a finger is dipped into ice water for 10 minutes pain is felt first in the immersed finger. Later it spreads to the finger on each side of it. If now the sensory nerves of these two adjacent fingers are locally anaesthetised so they are insensitive to pin prick

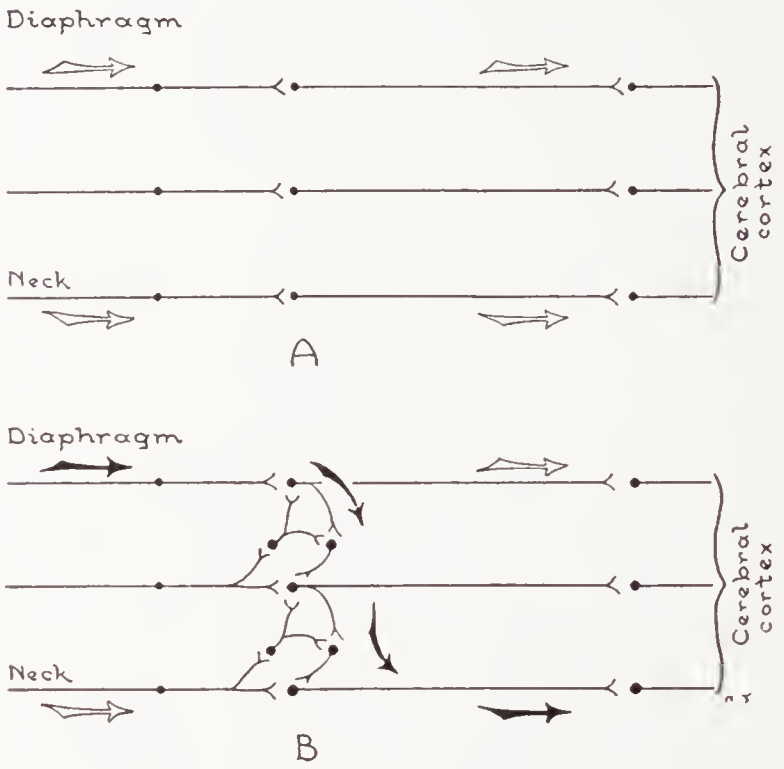

FIG. 2—In *A*, three chains of neurons are shown traveling independent courses, as would be required by a one-point-one-nerve-fibre theory of localisation.

In *B*, the same three chains are shown connected in a schematic way to illustrate the part played by the central nervous system in localising stimuli. The solid arrows show how impulses originating in the diaphragm may be misinterpreted, due to the presence of interconnecting fibres, as arising in the skin of the neck.

the pain is still felt in them. Thus pain produced by stimulation of one finger may be felt in three fingers due to the central spread of excitation.

The discovery of the connections between chains of neurons has also suggested a possible mechanism for referred pain. That is a pain felt remote from the site stimulated. Thus, as illustrated in the lower part of figure 2, impulses streaming into the fourth cervical segment from the diaphragm could reach and excite the secondary neurons in this segment which are part of the direct pathway from the skin of the neck to the cerebral cortex. The lack of previous experience in interpreting pain impulses from the diaphragm now leaves the cortex with only the information conveyed by the pathway coming from the skin of the fourth cervical segment. Hence the pain is interpreted as originating there, that is, just above the tip of the shoulder.

BIBLIOGRAPHY

Bishop, G. H.: The structural identity of the pain spot in human skin, J. Neurophysiol., **7**: 185-198 (1944).

Brodal, A.: *Neurological anatomy in relation to clinical medicine*, Oxford, Oxford University Press, 1948.

Clark, W. E. L.: Anatomical pattern as the essential basis of sensory discrimination, Oxford, Blackwell Scientific Publications, 1947.

Lewis, T.: *Pain*, New York, Macmillan Co., 1942.

Tower, S. S.: Pain, definition and properties of the unit for sensory reception, Res. Publ. Ass. Res. Nerv. Ment. Dis., **23**: 16-43 (1943).

Weddell, G., D. C. Sinclair, and W. H. Feindel: An anatomical basis for alterations in quality of pain sensibility, J. Neurophysiol., **11**: 99-109 (1948).

Wolff, H. G., and J. D. Hardy: On the nature of pain, Physiol. Rev., **27**: 167-199 (1947).

RECENT ACCESSIONS TO THE MEDICAL READING ROOM

Amer. Acad. of Pediatrics. Comm. for the study of child health services: **Health services for Massachusetts children,** by L. Snedeker. 1949.

Amer. public health association: **Diagnostic procedures for virus and rickettsial diseases.** 1948.

Bailey, H.: **Physical signs in clinical surgery,** ed. 11. 1949.

Bailey, H.: **A short practice of surgery.** ed. 8. 1949.

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Bergler, E.: **Divorce won't help.** 1948.

Biochemical Society, London. **Symposia no. 1.—Relation of optical form to biological activity in the amino acid series.** 1948.

——————— **Symposia no. 2.—Biochemical reactions of chemical warfare agents.** 1948.

Bruine-Altes, J. C. de: **The symptom of regression in different kinds of deafness.** 1946.

Canada. Pensions and national Health, Dept of: **Office consolidation of the regulations under the Food and Drugs Act. . . .** 1942.

Conway, R. J.: **Microdiffusion anaylsis and volumetric error.** rev. ed. 1947.

Godard, H. and Michel-Béchet, R.: **Nouvelle techniques de traitement des fractures.** 1949.

Gortner, R. A.: **Outlines of biochemistry.** ed. 3. 1949.

Hutton, J. H.: **Endocrinology, a brief review for physicians.** 1944.

Israels, M. C. G.: **An atlas of bone-marrow pathology.** 1948.

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Khairallah, A. ibn As'ad: **Outline of Arabic contributions to medicine.** 1946.

Kinsella, V. J.: **The mechanism of abdominal pain.** 1948.

Larsell, O.: **The doctor in Oregon.** 1947.

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Netter, F. H.: **The Ciba collection of medical illustrations.** 1948.

Nielsen, J. C.: **Studies of the aetiology of acute otitis media.** 1945.

Quiring, D. P.: **Collateral circulation; anatomical aspects.** 1949.

Roberts, F.: **Medical education.** 1948.

Simmons, J. S. (ed.): **Public health in the world to-day.** 1949.

Tobias, J. W.: **Tumores primitivos de la pleura.** 1928.

U.S. Public Health Service. Ind. Hygiene Division: **Publications . . . on industrial hygiene subjects,** 1942-1947. n.d.

U.S. War Department: **Military roengenology.** 1944.

Wainio, W. W.: **The utilization of sucrose by the mammalian organism.** 1949.

Westerlund, E.: **Clinical and genetic studies on the primary glaucoma diseases.** 1947.

A PROBLEM IN DIAGNOSIS, PART I

W. G BRUCE CASSELMAN, M.A., M.D.

PRESENTATION OF CASE

Mrs. M. L., a Sixty-six year old, white housewife, was referred to the Toronto General Hospital by an out-of-town physician for investigation of a possible carcinoma of the bowel. At the time of her admission on July 24, 1948, she complained of recurrent attacks of severe abdominal pain.

Apart from a tendency to constipation, to which she had paid little attention and for which she had taken some milk of magnesia about once per week for the preceding several months, and a weight loss of ten pounds over a period of eight months, this patient had been in her usual state of good health until early in February 1948. At that time, she suffered a sudden onset of extreme nausea followed by severe, crampy, generalized abdominal pain which lasted for two days during which time she remained in bed. The cramps were each of short duration and seemed to come in "waves." Following this upset, she noticed a marked loss of appetite which persisted up to the time of her admission.

Similar attacks of pain recurred at two or three-week intervals and lasted from a few hours to three days. They became increasingly severe and began to be accompanied by vomiting of any ingested foods or liquids, and by other disturbances. Toward the end of May, an attack had the following sequence: constipation; severe, crampy, abdominal pain tending to be most marked in the left lower quadrant; abdominal distention and a feeling of fullness; marked nausea; vomiting and diarrhoea, as well as considerable passing of flatus and belching. She remained in bed throughout each attack. In later attacks, a steady pain, not well localized, began to accompany the crampy one. A bowel movement tended to relieve the pain. The stools were usually brown, sometimes "dark", but not tarry. Gross blood was not observed in the stools or vomitus and the latter did not resemble coffee grounds at any time.

She ate only small amounts of food between the attacks of pain because of the anorexia and because larger portions of food caused a marked feeling of fullness and, later, even the sight or odour of food nauseated her. As a result, her food intake was grossly inadequate. She lost an additional twenty-five pounds during the six months before her admission to hospital.

Three weeks before admission to the Toronto General Hospital, the patient suffered an attack which persisted until after she came to the hospital. Although initially crampy, the pain became predominantly steady in character but varied in its intensity from day to day during the three-week period. It was considerably more severe than during previous attacks, however, and, for the first time, it radiated through to the middle of her back and to her left shoulder region, over the scapula but not to the shoulder tip. Her anorexia became progressively more marked and she ate very little food. Vomiting occurred more frequently—once or twice daily. The vomitus consisted of ingested foods and liquids, essentially undigested, and, usually, was very yellow in color but at no time was it observed to contain any blood. Bowel movements occurred

at intervals of from one to three days without any change in the character of the stools being noticed until four days before admission when four or five loose, dark stools were passed in one day.

At the age of sixteen years, she was supposed to have had a "stomach ulcer" but had no recurrence of it thereafter. During her only pregnancy, when thirty-seven years old, she suffered from "toxaemia of pregnancy." Three years later, she was told that she had "high blood pressure." She had a severe attack of herpes zoster at the age of sixty years.

Her personal and family histories are non-contributory.

Up to the time of the onset of her present complaints, she had considered herself to be active and healthy, although somewhat of a "nervous type," and was always able to do hard work and to sleep well. A detailed functional enquiry contributed no significant details apart from those relating to the gastro-intestinal system which have been presented above.

At the time of her admission to the Toronto General Hospital, this patient appeared alert, in some distress, but not acutely ill. It was difficult to assess the severity of her symptoms. She was thin and showed considerable evidence of recent weight loss. Her temperature was 99.4°F.; her pulse rate, 72 per minute; her blood pressure, 140 mm. systolic, 80 mm. diastolic; and her weight, 105 pounds.

Significant physical findings were limited to her abdomen which was slightly distended, of regular contour, and moved freely with respiration. Peristaltic waves of the large-bowel type were constantly visible at, and below, and to the left of the umbilicus. Deep palpation elicited some tenderness in the left lower quadrant. There was some increased resistance of the abdominal wall over the right upper quadrant where an irregular mass, contiguous with the liver and moving with respiration, was felt to extend about a hand's breadth below the costal margin. It was not tender or nodular and its edge was indefinite. The spleen was not palpable. The abdomen, including the area over the mass in the right upper quadrant, was tympanitic. There was no sign of shifting dullness. On rectal examination, the anterior wall of the rectum had "a corrugated feeling . . . like numerous sessile polypi," but no masses were felt and no gross blood was evident. The faeces on the glove of the examining finger were light brown in colour and gave a positive reaction with benzidine reagent within ten seconds. Nothing abnormal was found on bimanual pelvic examination.

Laboratory examinations revealed the presence of ketones (++) in the urine which had a specific gravity of 1.010; a haemoglobin concentration of 81%; a white blood cell count of 7,200 with a normal differential count; and no abnormal forms in the blood film. The Wassermann test was negative. The two-hour test of renal function demonstrated a power of concentrating up to a specific gravity of 1.020. The non-protein nitrogen concentration of the blood was 32 mg. per 100 cc., and the serum van den Berg reaction was indirectly positive, 0.7 units.

Radiological examination of the abdomen failed to show any evidence of intestinal obstruction in an antero-posterior view. The findings following a barium enema suggested the presence of a constricting lesion in the region of the splenic flexure and of generalized polyposis throughout the descending colon, the sigmoid and the rectum. There was

poor filling of the caecum. The results of a gastro-intestinal series were negative for lesions of the stomach and the first part of the duodenum.

A sigmoidoscopic examination was made and numerous small polypi were seen to line the entire rectum and the sigmoid at least as high as the region of the recto-sigmoid junction which was as far as could be visualized. Mucous membrane covered the polypi and there was no evidence of ulceration. Biopsies of two of the polypi were reported by the pathologist to show lymphoid hyperplasia of the submucosa.

During the two weeks following her admission to hospital, the patient's course was uneventful and she appeared to be improving without any definitive treatment until the night of August 7, when she had a sudden attack of right-sided, abdominal pain which radiated to her mid-lumbar region. By the next morning, she felt rather nauseated but did not vomit. Her temperature rose to 102.0°F., her pulse rate to 100 per minute, and her white blood cell count to 25,000. There was no pain associated with breathing and her chest was clear on examination. In her abdomen, there was rebound tenderness in the right lower quadrant, muscular guarding on the right side, but no definite muscular rigidity. An indefinite mass could be felt in the region of her umbilicus. She had a normal bowel movement during the first night of the attack and another during the following morning. On both occasions, the stools were light brown in color. A flat plate of her abdomen presented no evidence of obstruction of either the large or the small bowel. Her fever, leucocytosis and abdominal pain and tenderness receded rapidly while penicillin (50,000 units q. 3 h. × 4; 30,000 units q. 3 h. for 7 days) was given. By August 12, she was free from symptoms but a large, hard, slightly tender mass could be felt in the right side of her abdomen. It could be moved freely from side to side but it did not move with respiration. Bowel movements continued to be satisfactory.

Her condition steadily improved, the abdominal mass disappeared, and she was able to be on a full diet, until the morning of August 30 when, again, she suffered an attack of severe abdominal pain, initially crampy but later, steady, radiating through to her back and more severe on the left side of her abdomen. She felt quite nauseated but did not vomit. Her temperature was 98.0°F., and her pulse rate 88, per minute. She had two normal bowel movements. A large, tender, elongated, boggy mass could be felt lying across the abdomen at the level of and just above and below the umbilicus. It could be moved supero-inferiorly but not transversely. A rather hard region could be felt at its left end. The abdomen was silent on auscultation and no peristaltic waves could be seen. A barium enema examination was made.

SUMMARY: The problem in diagnosis presented by this case is that of a sixty-six-year old woman who, for approximately five and one-half months before admission, suffered recurrent attacks of generalized abdominal pain which was crampy at first but predominantly continual later, and which was accompanied by diarrhoea, nausea, and vomiting. During such attacks while she was in hospital, a variable, irregular mass could be felt in the abdomen, once in the right upper quadrant and twice in the region of the umbilicus. Extensive, submucous lympho-hyperplastic polyposis was found to involve the rectum and sigmoid and, probably, to extend up the colon at least as high as the splenic flexure.

(Continued on Page 107)

EXTERNAL DUODENAL FISTULA

R. J. HOLDEN, B.Sc.Med., M.D.*

Duodenal fistula as here considered, will be restricted to the external variety. This condition is usually encountered as a post-operative complication. Fortunately, it is rather rare for it is an extremely serious mishap, often leading to inanition, dehydration and death.

The causes of duodenal fistula may be discussed conveniently under three headings.

1. Trauma. In many operations in the upper, right quadrant of the abdomen, an unrecognized injury may be dealt the duodenum resulting in immediate or delayed perforation. Such instances have been reported after operations on the gall bladder and its ducts, on the right kidney, particularly in cases of neoplasm and tuberculosis, on perforated duodenal and gastric ulcers and after gastric operations requiring section and closure of the duodenal stump. Drainage material placed in direct contact with the duodenum may result in post-operative erosion and perforation.

2. Infection. There are a few reports in the literature of external duodenal fistula arising secondary to an acute suppurative cholecystitis with simultaneous involvement of the duodenum and the anterior abdominal wall.

3. Improper Healing. When a duodenal stump or ulcer is closed by suture many local conditions may result in necrosis—sepsis, surgical trauma, malplaced sutures, poor haemostasis and undue interference with the blood supply of the duodenal stump. The general nutritional state of the patient is important also, for depleted protein stores, low vitamin C levels, anaemia may retard healing of a suture line.

The seriousness of the condition arises from two factors, the local autolysis of the wound and the general effect of loss of electrolytes and metabolites. The duodenum is the receptacal for the HCl-pepsin complex from the stomach, bile from the gall bladder and trypsin, lipase and bicarbonate juice from the pancreas. This combination of enzyme systems is able to digest protein and fat in an alkaline medium. The resulting autodigestion of the anterior abdominal wall is extremely rapid.

In addition, there is a considerable outpouring of chlorides, water and bicarbonate. Despite the loss of bicarbonate, there is a rise in CO_2 combining power which does not parallel the chloride loss due to the increase in ketone bodies and organic acids resulting from impaired metabolism and tissue breakdown.

Dehydration is quickly apparent, due to actual loss of fluid and inability of the body to retain water in the face of falling electrolyte levels. Due to the dehydration there is an increase in blood viscosity with delayed blood circulation time and resultant tissue anoxia.

Kidney function is embarrassed by the slowed blood circulation and the increased burden of protein catabolism. This results in rising N. P. N., creatinine and urea levels and falling urinary output.

As a result of the fistulous interruption of intestinal continuity, ingested foods are extruded through the fistula 15-20 minutes after they are ingested in practically an untouched state. This causes starvation with a catabolic metabolism resulting, as evidenced by anaemia,

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falling serum proteins, and ketonaemia from incomplete fat oxidation.

Thus, it is readily apparent that the systemic repercussions of a duodenal fistula are fully as important as the local wound disruption. Frequently in the past, patients exhausted by a primary operation have literally drained to death through these fistulas.

Anatomically, duodenal fistulas may be classified as terminal or lateral. The terminal ones result from the leaking of a duodenal stump produced in an operation that has also provided continuity of the intestines at another site, e.g., gastro-enterostomy. These fistulas have a natural tendency to heal. The lateral type consists of a partial defect in the wall of the duodenum but the continuity of the gastro-intestinal tract at that site remains intact. Due to the retraction of healing scar tissue which causes the wound to gape, this type is much more difficult to close than the terminal one.

The diagnosis of duodenal fistula is usually obvious. It generally appears 3 to 15 days following an operation in the right upper quadrant. A small sinus appears in the wound, through which drains a yellowish, clear fluid. During the development of this sinus, the patient is afebrile and not necessarily in pain. There is a characteristic rapid excoriation of the wound and skin edges. The tissues literally seem to melt away and copious amounts of discharge appear, which are irritating to the skin. Methylene blue fed by mouth appears in the fistula within 15-20 minutes. As a result of the breakdown of tissue around the fistula, disruption of the wound and evisceration may occur.

The amount of fluid pouring from the fistula varies from 200 to 2000 cc. daily. The patient rapidly deteriorates; he is dehydrated, starved and frequently toxic. The prognosis depends on the resistance and general condition of the patient, the size of the fistula, the amount of fluids lost and the treatment. Some smaller fistulas close spontaneously after a variable period of time up to 2 months, while the larger ones continue to pour forth great quantities of pancreatic juice ferments, causing the patient to die of inanition and secondary sepsis.

TREATMENT

Until about 1920, treatment of this condition was unsatisfactory, a mortality rate of 50% being generally accepted. Up to this time the treatment had consisted of heroic measures—excision of the fistula with closure of the duodenal defect, gastro-enterostomy with pyloric exclusion and jejunostomy. These were rather radical procedures to perform on the fistulous patient who was generally in an extremely undernourished state by the time the decision to operate hesitantly had been made. Besides, the duodenal closure usually broke down and, unless performed early, the gastro-enterostomy was too major a procedure.

About 1920, surgeons began to examine the possibility of non-operative treatment with a view to tiding the patient over his nutritional disturbance and gradually drying up his fistula.

Potter, after a consideration of the anatomy of the duodenum and the pathology of the ulcer-bearing area found that closure of the fistula presented almost insuperable difficulties. He then proposed his conservative regimen of treatment which consists of (*a*) neutralization of the pancreatic ferments and (*b*) maintaining a normal electrolytic balance.

To quote Potter, "the keynote of treatment is the local application of tenth-normal hydrochloric acid and sterile beef juice. The former is used to overcome the alkalinity of the intestinal content.

The latter supplies a foreign protein with which the pancreatic juice first comes in contact and digests it and not the abdominal wall."

Briefly, the method is as follows. A solution of N/10 HCl is run through a small catheter inserted into the fistula and a solution of beef broth is run via a Dakin's irrigator into gauze pads wrapped about the wound. Another catheter, attached to a continuous suction machine and lying in the fistula, mechanically clears it of digestive juices. The use of the suction is fully as important as the HCl and beef juice.

Numerous substitutions have been made. Acetic acid has been tried, but it causes skin irritation itself. Hydrobromic and tannic acid have been used. Crude peptone solutions and blood serum have been successful instead of the beef broth.

To these essential procedures have been added several useful adjuncts. Boiled milk, acidophilus milk and reliquified milk-concentrates have been used by McEvers in an effort to neutralise the trypsin-HCl complex inside the bowel as well as by inducing constipation and so reducing the unbridled outpouring of pancreatic ferments. Lyons and Levine tubes have been passed with continuous suction applied for the same purpose.

Ahrens in 1925 reported a successful treatment of external duodenal fistula using a rubber T-tube. The tube was inserted in such a way as to redirect the chyme into the efferent crus of the intestine. The tube was of thin rubber so that the pressure of the wall of the fistula was sufficient to occlude the external arm.

Consoles and O'Connell, in 1944, reported the cure of an extremely stubborn fistula by plugging it with alternate layers of cotton wads and whole blood. This packing was changed every 48 hours until the fistula closed from below by healthy granulation tissue. In 1947, a case was reported wherein gravity drainage in the prone position on a Streicher frame was used to avoid soiling the abdominal wall.

So much for the local treatment of the wound. We turn now to the patient's precarious general condition. It is important to realize that grave electrolytic imbalance may occur in a very short time. Treatment must start as soon as the diagnosis is confirmed by (*a*) methylene blue, (*b*) bile staining of the dressings. The guides to parenteral therapy are the serum proteins, CO_2 combining power, plasma chlorides, and 24-hour urinary output. Administration of 5% glucose, 3000 ccs. daily, plus saline solution equalling the amount of fluid lost through the fistula is usually sufficient. The proportion of saline and distilled water administered should be checked by doing a daily blood chloride level. A urinary output of 1000 ccs. daily is evidence of adequate fluid intake.

If the patient is able to eat, a high protein diet should be given, if not, blood transfusions and amigen may be added.

In some cases, parenteral therapy inadequately deals with the rapidly deteriorating nutritional state of the patient. The need of establishing a jejunostomy early is great—the outlook is poor if it is not done; through such a route, the drainage from the wound may be replaced in the intestinal tract and supplemented by added proteins, vitamin C and minerals.

In résumé, it briefly may be stated that the treatment falls into two classes.

(*a*) Local—neutralization of ferments plus suction

(*b*) General—elecrolytic plus water balance—parenteral
—jejunostomy

The following report of a case, recently treated at the Toronto General Hospital, is a typical example of duodenal fistula.

Mr. A. D. B., a 48-year-old white male, was admitted on March 3, 1948 with a twenty year history of epigastric pain beginning two to three hours after meals, and worse each fall and spring. No haemetemesis or melena. Examination revealed an underweight patient (145 lbs, 6′ ½″ height) without other significant physical findings. Hb. 85%; X-Ray showed a deep ulcer at the pyloric sphincter with deformity of the caput. Test Meal revealed a fasting free HCl of 87 units, with ++++ benzidine.

At operation on 19 March, it was intended to do a radical (75%) partial gastrectomy with removal of the pylorus and first part of the duodenum. However, great difficulty was encountered in trying to mobilize the duodenum and pylorus; consequently a Bancroft type gastrectomy was done, leaving the duodenum and pylorus *in situ* but coning out the pyloric mucosa. The operation was finished successfully. The pathology report revealed chronic gastritis.

Post-operatively, the patient ran a moderate fever from 100—103°F. on occasion. Räles and some dullness in the right lower lobe were consistent with a post-operative pneumonia and the patient was given penicillin; although his chest cleared, his temperature remained elevated. On March 20, the patient complained of dull throbbing pain in the right upper quadrant and his temperature "staircased" to nearly 102°F. On March 31, his incision broke down for ½″ at its upper end, discharging a little yellowish fluid. A culture at this time revealed B. lactis aerogenes. On April 2, the discharge was yellowish and watery and associated with some excoriation of the skin. The exudate was positive for bile pigment and methylene blue appeared on the dressings 25 minutes after administration. The N. P. N. was 50 mgms. %, serum proteins 6.5%, chlorides 569 mgms. % as Na Cl, urine output 620 cc.

Treatment was immediately started. Crude peptone dressings were applied to the wound, N/10 HCl was dropped into wound through a catheter, and continuous suction was applied to the surface of wound with another catheter, a total of 3000 cc. of glucose alternating with glucose-saline was given daily. A duodenal tube was put down for three days. With this treatment the temperature fell to normal in 48 hours and urinary output increased to 1280 cc. A daily intake, via intravenous, of about 4400 cc. was maintained for three days, after which time the patient's general condition appeared excellent. Duodenal tube and intravenous were discontinued and a fluid gastric diet by mouth was allowed, supplemented with protein and 100 mgm. of vitamin C daily. Patient's appetite increased and he gained weight, although he still lost some 1000 cc. daily from the wound more than that supplied by N/10 HCl. The wound became excoriated down to the rectus sheath; the fistula was ½″ in diameter. However, within one week of instituting treatment, the wound was dry and covered with healthy granulation tissue and the discharge was negative for bile pigments. The suction and acid were discontinued on the sixth day of treatment. Seven days after opening the fistula, the serum proteins were 6.0 mgm. %, plasma chlorides 609 mgms. % (Na Cl) and haemoglobin 96%. At no time had urinary output fallen below 1000 ccs. daily. The would healed slowly by granulation tissue and the patient was discharged on April 28, 1948 with a small superficial area of healthy granulations which subsequently healed completely at home.

REFERENCES

(1) Caryl Potter, J. Missouri M.A., **29:** 374 (1932).
(2) Parsons, W. H., Western Medical Review, **34:** 309 (1929).
(3) Lunardi, B., Il Policlinico, **46:** 643 (April, 1939).
(4) Nario, C., An. de Fac. de med.—Montivideo, **10:** 949 (1925).
(5) McEvers, Albert, Surg., Gynec. & Obst., **58:** 786 (1934).
(6) Cohnheim, O., Z and Schr. f. Biol., **1:** 268 (1909).
(7) Winkelbauer, A., Deutsche Ztschr. f. chir., **196:** 232 (1926).
(8) Fischer, A., Zentralorgan für die gesampte Chirurgie und ihre grenzgebiete, **11:** 424 (1921).
(9) Thompson, L., Am. J. Surg., **43:** 783 (1939).
(10) Pignatti, A, Bull. d. sc. med., **96:** 402 (1924).
(11) Berg, Albert Ashton, Ann. Surg., **45:** 721 (May, 1907).
(12) Martlett, Marshall, K., New England J. Med., **218:** 587 (April, 1938).
(13) Consoles, P. A. and O'Connell, W. T., New England J. Med., **231:** 582 (October, 1944).

SUMMER INTERNESHIP IN A SMALL GENERAL HOSPITAL

JOHN H. B. SKINNER, B.A., 5TO

STUDENTS IN THE THIRD medical year who are planning their summer employment would be well advised to consider interneship in a hospital staffed by capable men willing to teach good medicine. The hospital should be sufficiently small to ensure adequate opportunities to gain practical experience and sufficiently complete in its services to ensure training in all branches of medicine.

Such interneships are available in many communities. The writer's experiences in the Kirkland Lake hospital last summer will indicate how the student may secure, and what he may expect from, such an interneship.

First of all a hospital should be selected which will provide a wide variety of experience. Then the proposition must be sold to the hospital. Many hospitals have never had the services of an interne, and must be convinced of the advantages of such an addition to their staff.

The 110-bed Kirkland and District Hospital is in a Northern mining community. The hospital is complete in most of its services because of the great distance from larger medical centres.

The author was the first interne the hospital had ever had; he experienced no difficulty in convincing the medical staff that he was willing and able to do much of the work they had formerly done.

In surgery, the interne examined, and wrote histories on the patients admitted. He usually acted as first assistant at their operations and did many of the minor surgical procedures himself, under supervision. He was able to follow their postoperative course and to note the improvement in their condition as the result of the operation. He learned to recognize and deal with common postoperative complications, many of which constitute genuine emergencies. The training received in handling fractures and other orthopaedic problems will be of immense benefit when the student begins his private practice.

The specialties services in this hospital were headed by excellent men with whom the interne was encouraged to make ward rounds and perform or assist with all the specialized procedures. This gave him an insight into the formerly obscure world of ophthalmology, otolaryngology, urology, radiology, anaesthesia, etc., and enabled him to manage cases in the absence of the department heads.

What should be done in a case of acute retention due to rupture of the urethra hours earlier, where not even a filiform catheter could be passed? How is perfect vision restored to a patient with a knife wound of the cornea? What is the treatment for a patient who is losing pints of blood from her nose and mouth? What care is required for the mentally ill patient who anxiously awaits an opportunity to commit suicide? Which of many anaesthetics should be used in a specific case and how should it be administered? These and similar problems will occur during an interneship of this type, and the experience gained from them will prove very valuable.

The medical service provided an unparallelled opportunity for gaining skill in the making of diagnoses. There were an average of 15 admissions a day, including children. It was the duty of the interne to take histories on, and to examine, as many of these patients as time permitted, and to discuss their

treatment with the physicians and follow their progress. Routine jobs such as intravenous therapy, blood bank work, emergency, became thoroughly familiar. The interne was able to see the miracle wrought by Chloromycetin in severe typhoid, to learn isolation technique in treating polio and other communicable diseases, to observe the importance of physio-, occupational, and diet therapy, and to deal with unconscious, uremic, diabetic, jaundiced, alcoholic, febrile, chronically ill, psychotic and dying patients.

The interne was able to observe at first hand the workings of the provincial laboratory, which carried out bacteriological, biochemical and microscopic work for the hospital and district; he was able to pinch hit for the director in emergencies. Laboratory work is intensely exciting when one is preparing a transfusion for an infant with erythroblastosis foetalis in the middle of the night when minutes count, or studying the biochemical effect of Prestone ingestion and subsequent refusal to eat or drink for over a month on a patient seeking death.

Obstetrical and gynaecological work was enjoyed most by this student. Here it was possible to study at first hand the many disorders of the pregnant and non-pregnant women and to observe the effects of a variety of treatments. The pregnant woman could be followed throughout her pregnancy and puerperium; there were many opportunities for carrying out special examinations and for delivering patients. The interne was able to assist in treating a woman with severe eclamptic convulsions and in delivering her after control of the toxemia; to help deal with a transverse lie in a patient who came to hospital late in labour, with her membranes long ruptured; to watch a nearly exsanguinated patient, with inversion of the uterus, brought back to life.

In this, as in all types of medical training, the benefits gained are directly proportional to the amount of energy put into the task. Filled with unforgettable experience, summer interneship in a small hospital is a unique opportunity for the conscientious undergraduate to prepare himself for the practice of medicine in an essentially practical manner.

A PROBLEM IN DIAGNOSIS, PART II

W. G. BRUCE CASSELMAN, M.A., M.D.

DIFFERENTIAL DIAGNOSIS

In considering the differential diagnosis of the case presented in Part I, it is necessary reasonably to explain an abdominal syndrome characterized by (*a*) abdominal pain which was generalized but more severe in the lower abdomen, which was predominantly crampy initially but predominantly continual later, and which, during the last few attacks, radiated to the back and shoulder regions; (*b*) a mass in the abdomen which was somewhat tender, which varied in its size, shape, position, and mobility from one attack to another, which was not palpable for some time between attacks, and which was felt once to have a rather hard region toward one end; and (*c*) disturbances of gastro-intestinal function.

Because of these characteristics, it is possible to exclude *extra-abdominal conditions* causing abdominal pain, such as diseases of the chest and spine.

The frequent recurrences of the attacks, the periods of relative well-being between the attacks, and the presence of a mass in the abdomen associated with an attack exclude such conditions as *renal colic*, *peptic ulcer*, *appendicitis*, and *peritonitis*.

The patient's history and the findings on physical, laboratory and radiological examinations make any *gynaecological condition* or *visceroptosis* highly improbable. The features of the abdominal mass, in particular, make a diagnosis of *biliary colic* very unlikely.

The gastric crises of *tabes dorsalis* may cause generalized, severe abdominal pain but there is no other indication of this disease in the patient and, normally, it is unassociated with an abdominal mass. *Lead colic*, too, may cause severe attacks of generalized abdominal pain, but the occupation of the patient, her history, and the physical findings lend support neither to this diagnosis nor to one of colic due to the ingestion of some other *heavy metal, foods, or drugs*.

Abdominal neuralgia is a diagnosis which should be applied with great caution, if at all, to any case and then, only when it is certain that no organic disease exists. It definitely cannot be applied to this patient.

Acute or subacute *intestinal obstruction* is a common cause of general abdominal pain. The most reasonable explanation of this patient's complaints and the clinical observations is on the basis of partial intestinal obstruction, either recurrent, subacute or chronic. Any cause of intestinal obstruction put forward as the diagnosis must explain the rather unusual features characterizing the abdominal syndrome observed in this case and presented above. An unusual cause well may be anticipated, and such a one, *intussusception*, provides the most satisfactory explanation. This condition occurs infrequently in adults, is usually subacute or chronic, and gives rise to such symptoms and signs as were found in this patient. Although the intussusception usually begins at or near the ileocaecal valve, the right iliac fossa is, as a rule, the most unlikely place in which the mass will be felt because as the intussusception travels along in the colon, its hardened, distal end will be felt below the liver, in the epigastrium, in the

umbilical region, or even on the left side of the abdomen. In this case, the pain, as nearly as it could be assessed, is in keeping with involvement of the ileocaecal region of the bowel and of the ascending and transverse colons; and the mass was found successively below the liver and in the umbilical region and possessed the characteristics of the mobility and the orientation of the large bowel in these regions. The early, short, crampy pains may be explained as being due to the contractions of the large bowel against the obstructing intussusceptum, and the later, steady pain probably as being due to peritoneal irritation associated with swelling at the site of the obstruction. The radiation of the pain to the back may have been related to traction on the mesentery by the intussuscepting portion of the bowel.

Having accepted the diagnosis of intussusception, there remains the question of its cause. The biopsy report of submucous lymphoid hyperplasia and the sigmoidoscopic and early radiological findings suggest the possibility of a large polyp, probably one of the lymphoblastomas, in the ileocaecal region, most probably in the terminal ileum, initiating the intussusception.

In view of the age of the patient, her appreciable weight loss, and her symptoms, the possibility of carcinoma accompanied by inflammation might be considered as the cause of the intestinal obstruction. With such a diagnosis, however, it is particularly difficult satisfactorily to explain the periods of relative well-being between the attacks, and the variable abdominal mass appearing with the attacks and disappearing afterwards.

CLINICAL DIAGNOSIS

Intussusception

The barium enema revealed the presence of a large intussusception in the transverse colon.

TREATMENT AND CLINICAL COURSE

On September 13, 1948, under general anaesthesia, the abdomen was opened through a right rectus, muscle-retracting incision. Significant abnormal findings were limited to the intestines where a large intussusception of the terminal ileum into the transverse colon was found. It was readily but incompletely reduced. A routine right colectomy was performed and the remaining ileum anastomosed to the transverse colon. Her postoperative course was relatively uneventful and the patient did well on a low residue diet with added mineral oil.

The pathologist reported a lymphoblastoma tumour in the terminal ileum which appeared to be the initiator of the intussusception. Lymphohyperplasia was found throughout the right colon and the section of the ileum removed at operation.

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EDITORIAL

GOOD WILL TOWARD MEN

This is the Christmas Season—the time when thoughts turn to the message of the angel, " . . . on the earth peace, good will toward men". It should be a most opportune moment to examine ourselves carefully and to cast out any false assumptions of superiority, evaluating truly and generously the achievements of all races, creeds and nations.

That some hospital boards may have neglected to adhere to this precept when selecting internes is suggested by recent complaints of racial and religious discrimination. It is difficult to assess the validity of these, but if they are true and such a deplorable situation does exist then its early rectification is indicated. Although we, as undergraduates, can do little to remedy such a condition now, we can remember, should we find ourselves in positions of authority in later life, to attempt to overcome our own prejudices. For the present, let us be sure that we have not allowed the prejudice of selfish interest to sway us to hasty and possibly unfair criticism.

"To overcome human prejudice is the most difficult thing that a man can try to do. Its very difficulty should be a stimulus to effort" (Mervyn Archdall).

"What I inveigh against is a cursed spirit of intolerance conceived in distrust and bred in ignorance that makes the mental attitude perennially antagonistic, . . . that subordinates everywhere the race to the nation, forgetting the higher claims of human brotherhood" (Osler).

Season's Greetings

The members of the staff of THE JOURNAL extend heartiest Season's Greetings to all. May you have a cheerful, merry Christmas and a happy, successfull New Year.

HUMANISM AND MEDICINE

H. B. VAN WYCK[1]

PART IX

THE DECLINE OF THE ROMAN EMPIRE AND THE BIGINNING OF THE DARK AGES

THE DECLINE of the great Roman Empire has always aroused the most intense interest of the student of history, and it may ever be the focus of inquiry to any who see signs of impermanence in their own political environment and security. That a people of worth and stable character, after building an Empire on the broad and sound foundation of law and justice, should lose both that character and that Empire may not be explained by any superficial theory of the growth and decay of civilization. On the surface, the imperial structure bestriding as it did the world as a colossal edifice of government, even at this distance of time is still imposing; but, at the peak of its prosperity, a closer scrutiny reveals some of the corroding influences that brought about its downfall.

Those who enumerate the succession of barbarian invaders, our ancestors, who came south to destroy Roman civilization, may regard the fall of the west as an inevitable submersion by the overwhelming flood of rude and ferocious Germans, Goths, Vandals and Franks. The question, however, arises why this highly organized and civilized state did not succeed in making obedient subjects, allies, and citizens of our untaught forefathers as it did of the conquered races of the Mediterranean shores and the Near East. Why was the subsequent affiliated civilization of northern Europe achieved only by the death of the parent Graeco-Roman world? Is it a law of civilization that death must precede birth? Is Spengler right in assuming that the death of civilization is inevitable? The answer of such a query is of vital importance to our contemporary world. A pessimistic view would be that if the best of our western world is to be disseminated among the other societies on this planet, our institutions and our society must perish in the process of assimilation and our western society follow the Empire of the Caesars into the dust heap.

An inquiry into the decline of Rome should attempt to establish whether the effective cause was without or within; and the historical analyst may find analogies in our present dilemma to the external violence which threatens us and the symptoms of internal decay which may appear. The many vulnerable defects of the doomed Roman Imperial edifice were obvious to the wise even at the happiest period, the centuries from 30 B.C. to 180 A.D., which includes the span of years lauded by Gibbon as the serenest in the annals of mankind. From London to the African provinces, from Lisbon to Antioch, there was a flourish of prosperity during the reign of the Antonines, but the magnificent buildings and the abundant cultivation of the fields was the work largely of

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slaves. The Marxist hastens to point out that our great Industrial Revolution has produced slavery of another type, and the student of literature must admit that the softening of manners and the increase in humane feeling which adorned the pages of Roman literature applied mostly to the privileged free citizens and not to the slaves. The privileged classes of today are too ready to forget that the modern standard of life with its culture and its humanity is not always enjoyed below certain economic levels.

The Imperial Roman produced an age of spending rather than creation just as the western world today has discovered too late that it has squandered its wealth in forest, oil, and coal largely in fratridical war. The Roman wasters were blind to the value of science. With little intellectual curiosity they accepted what the Greeks had to teach, often more as an engaging hobby and practical advantage than as a stimulus to further creation. The modern world of Western Europe has avoided this weakness, thanks to our universities; and, in only one country of our modern world does science not enjoy the academic freedom necessary for its nurture. The lack of ideal academic freedom is as corroding to political stability today as it was to the Roman polity.

The stagnation of science that occurred after the Alexandrian period may be explained by the fact that the Romans were not curious about the unknown. This explains the lack of a Roman literature of travel beyond the imperial limits. The Romans had no Herodotus to return from abroad with fascinating accounts of the outside world. Scientific curiosity was stifled by the vulgar and ostentatious wealth of those who should have been its protagonists. The later Roman Empire with its deified Emperor was a despotism and despotisms with few exceptions have always enslaved intelligence. The Romans were content to leave scientific experiments, especially those which soiled the hands, to Greeks and slaves, and science does not thrive where men are not free. "Roman science was stillborn into the suffocating atmosphere of the vile wealth and military oppression of the declining Empire."

Ruled by the bureaucracy of a degenerating civil service, the Empire expanded beyond the capacity of the slow means of communication to hold it together, and the army changed through the centuries from disciplined legions of free citizens to undisciplined barbarian mercenaries. The lands of peasant-owners fell into the hands of large proprietors with slave labour and the dispossessed small farmers became the rebel proletariat of Rome. The Roman was unable to boast as Tennyson could up to the mid-point of the last century:

"It is the land that freemen till."

With this cultural and economic decay, the common people, free as well as slaves, unhappy and apathetic, had little heart to resist the invading barbarians; and, whenever people who till the land feel insecure or are actually dispossessed, population declines. By the fourth and fifth centuries A.D., instead of sturdy and stable citizens who had created the early Republic, the great Empire contained 150 million wretched and insecure subjects without aim or hope, and content became the possession of the few with privilege. With political order failing, the common man turned for the restoration of hope and self-respect to Christianity with its doctrine of immortality and brotherhood and with its recognition of the rights of the individual; and this, while it fostered support of

spiritual and moral order, did nothing to support the crumbling Imperial government.

The subversion of civil order in the western Roman Empire began in the 4th century and was complete in the 5th when the last Emperor of the west disappeared, 476 A.D. Now began the period of one thousand years known as the middle ages, and of these, the first three centuries earned the expressive term "Dark Ages." Civil order gradually disappeared. Tribe after tribe of destructive Germanic peoples poured south in raids of spoliation. All that was left of civilization in the west was the church; and it is the imperishable glory of the Roman ecclesia that, shorn of the support of temporal potentates, she arrested the invaders and ultimately subdued them by the moral authority of the Cross.

It is needless to disentangle the disordered and blood-stained annals of these three dark centuries. "The break-up of this vast empire was followed by scenes of horror and chaos not only far more intense than what we have seen in the most unhappy districts of modern times, but prolonged for a period exceeding the worst that we can reasonably fear as a result of the present international rivalries and class conflicts."[3] Alexandria with its library was burned; schools disappeared; philosophy was torn from her high place; science, mathematics and astronomy were almost extinguished; and medicine, which had been directed to a high destiny by Hippocrates and Galen, degenerated into stagnation and superstition. When the barbarians of Alaric the Goth had taken even Rome itself, it was as though the sky had fallen. St. Jerome wrote:

"No doubt all things born are doomed to die, but who would have believed that Rome, victorious so oft over the universe, would at length crumble to pieces."

And a century later, St. Gregory the Great writes in an even greater depth of despair:

"What is there now, I ask, to please us in this world? Everywhere we see mourning and hear groans. Cities are destroyed, strong places are cast down. The fields are depopulated and the land has become desert. No inhabitants remain on the land, and scarce any in the towns. We see some led into bondage, others mutilated, others slain. What is left of that Rome which once seemed mistress of the world? Moreover, whatsoever we say concerning this grinding of Rome to pieces we know to be repeated in all the cities of the world."

In contrast to this cry of despair, a greater contemporary lifted his voice in vehement reaction to disaster. With paganism threatening to return, its adherents blamed the collapse of order on Christianity. At this point St. Augustine's *City of God* appeared, a book which had and still has an immense and enduring influence. Rome, he wrote, in the first part of his work, was not greater or more enduring than the empires which had preceded her. The city founded on bloodshed had stained her annals with a succession of wars and the blood of the Christian martyrs. Nevertheless, alive to the true greatness to be found in her past, St. Augustine regarded Rome as the pedagogue for the coming new world. Then in the latter half of his thesis, he discusses the indestructibility of spiritual life. The world may perish but the life of the spirit survives to eternity,—a Platonic concept. This book expounds a true exposition of the philosophy of history. "The dualism of its theme is at bottom true for all ages. There has always been this contrast between spirit and matter, between the visible, existing institution which we obey as a matter of present duty and the future world which

we hope for to be built some day on the ruins of what now exists. For the western world drifting now without rudder or compass, it was necessary to find some system of thought which not only accepted far wider responsibilities than the old, but which should also be far more independent of outward and visible support from the state. . . . To cling to a crucified leader, to insist upon the truth of spiritual brotherhood among all mankind, a brotherhood which could not be broken by all the changes and revolutions of states or cities—to insist in these truths was to steel the soul against all outward enemies. For everything was thus based upon the fundamental fact that outward failures may be turned to inward success; he that loseth his life shall find it."[4] The influence of St. Augustine did much to mould Christianity and this faith did constrain the European civilization that was to come into new channels. To quote a grand passage from Coulton's "Mediaeval Panorama": Christianity "took more men out of themselves, and took them farther out of themselves, than any other recorded event in Western history, and, as most of us would think, in the history of the whole world. By whatever process, it fused into one single wire the main strands of pre-existing thought: Roman State Religion, Philosophy, Judaism, and the Oriental Cults. From the first it took its impressive ceremonial and system of government; from the second, higher speculation; from the Jews their monotheism, and from the Cults their mystic exaltation. Not, doubtless, without some of their weaker qualities also; not without State formalism and philosophic word-splitting and Jewish intolerance, and something of that temperamental licence which, in the Cults, put enthusiasm above morality. Yet these weaknesses came out mainly in the course of time, and with the dilution of the original impulse. Primitive Christianity was democratic, however autocratic the hierarchy may have finally become; it was spiritual at first, however rigid in its later institutionalism."

The falling off in science and humanism began before Christianity had invaded the high offices of state and need not be attributed to ecclesiastical influence. Although the other-worldly emphasis placed by the new religion on preparation for the life beyond did not tend to encourage inquiry and experiment into the phenomenal world, it must not be forgotten that in the case of the barbarian invasions, the Church preserved for the modern world much of the treasures of the past. In a justly famous passage, Macaulay, having observed that it was fashionable in the 18th century to speak with contempt of the pilgrimages, sanctuaries, crusades and monastic institutions of the Middle Ages, states:

"In times when men were scarcely ever induced to travel by liberal curiosity, or by the pursuit of gain, it was better that the rude inhabitant of the North should visit Italy and the East as a pilgrim, than that he should never see anything but those squalid cabins and uncleared woods amidst which he was born. In times when life and when female honor were exposed to daily risk from tyrants and marauders, it was better that the precinct of a shrine should be regarded with an irrational awe, than that there should be no refuge inaccessible to cruelty and licentiousness. In times when statesmen were incapable of forming extensive political combinations, it was better that the Christian nations should be roused and united for the recovery of the Holy Sepulchre, than that they should, one by one, be overwhelmed by the Mahometan power. Whatever reproach may, at a later period, have been justly thrown on the indolence and luxury of religious orders, it was surely good that, in an age of ignorance and violence, there should be quiet cloisters and gardens, in which the arts of peace could be safely cultivated, in which gentle and contemplative natures could find an asylum,

in which one brother could employ himself in transcribing the Aeneid of Virgil, and another in meditating on the Analytics of Aristotle, in which he who had a genius for art might illuminate a martyrology or carve a crucifix, and in which he who had a turn for natural philosophy might make experiments on the properties of plants and minerals. Had not such retreats been scattered here and there, among the huts of a miserable peasantry, and the castles of a ferocious aristocracy, European society would have consisted merely of beasts of burden and beasts of prey. The church has many times been compared by divines to that ark, of which we read in the Book of Genesis: but never was the resemblance more perfect than during that evil time when she alone rode, amidst darkness and tempest, on the deluge beneath which all the great works of ancient power and wisdom lay entombed, bearing within her that feeble germ from which a second and more glorious civilization was to spring.

"Even that spiritual supremacy arrogated by the pope was, in the dark ages, productive of far more good than evil. Its effect was to unite the nations of Western Europe in one great commonwealth. What the Olympian chariot course and the Pythian oracle were to all the Greek cities, from Trebizond to Marseilles, Rome and her bishop were to all Christians of the Latin communion, from Calabria to the Hebrides. Thus grew up sentiments of enlarged benevolence. Races separated from each other by seas and mountains acknowledged a fraternal tie and a common code of public law. Even in war, the cruelty of the conqueror was not seldom mitigated by the recollection that he and his vanquished enemies were all members of one great federation."

When, about 800 A.D., the light of hope begins to shine again in the west, the mediaeval world of Western Europe is found taking shape and this changed and strange world will always remain a fascinating study for posterity. The Graeco-Roman world has expired and in Mediaeval Western Europe we find the birth of our modern civilization and society. The mediaeval period from the 8th to the 13th century is a field of study to understand which some of the finest of contemporary intellects have directed their efforts in historical and philosophical research, and in appraisal of their work, objectivity is difficult to preserve. One must recognize that there are at least three types of viewpoint: the Catholic, the Protestant, including the Jewish and a third viewpoint which takes little account of the religious concepts of the time and regards only the material factors involved. The former two recognize fundamental values in the mediaeval civilization, values which the purely physical and materialistic point of view ignores.

It was an age of scientific regression, of superstitious practices, and of intolerance. Those who see nothing else in the Middle Ages are blind to its redeeming qualities. Though it was an age of scientific darkness, it was at the same time an age of faith and of values and could modern man have kept inviolate some of that faith and in part those values, with that sense of unity characteristic of mediaeval Europe, our civilization would be more secure today.

FEATURE

ADDRESS TO THE GRADUATING YEAR AT CONVOCATION, 1949

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It was with the greatest pleasure that I accepted the invitation to address this graduating class, for it happens that they are the last of our graduates who will remember me, and it is so much more pleasant to talk to old friends than to complete strangers.

The speed with which one is forgotten is surprising. Not long ago I came into the Emergency one night with a compound dislocation of my thumb caused by falling down stairs in the dark. The nurse on duty, to whom I explained my predicament, directed me to sit on the penitent bench, with which you are all familiar, between a slumbering inebriate and a somewhat doubtful looking young woman whose face, in spite of a black eye, glowed with positive health. I then listened to the telephone conversation in which the nurse apologized to the Resident for calling him at such an unseemly hour, but she explained that the old man who had just come in insisted on seeing the Resident and no one else. So I waited patiently for a long time and then down the hall he came, whistling a bit from Oklahoma, I think it was "Oh what a beautiful mahnin." Then he stopped dead as he saw me and said: "Why, Professor Gallie, what are you doing here?" Well, the effect on the nurse was wonderful! However, she got over it, and I heard that she soon married and, as Churchill said, lived happily ever after. But so much for Deans and Professors!

In thinking of what I might say to you that would be interesting and perhaps useful I have tried to recall what we thought and talked about on my own graduating day. Without doubt the most important question was, "Where do we go from here?" If the graduating class of 1949 resembles that of 1903 each member of it will be thinking of the road he will travel when he leaves this hall, the proud possessor of his doctor's degree.

I have often wondered as I have looked into the faces of successive freshmen classes just what it was that attracted these young people into Medicine. In my own case it was that I happened to know a great doctor, the father of one of our Board of Governors, whose character, skill and devotion to his art and science were so admired by me that I could do nothing else than try to follow in his footsteps. Many of you, I know, are sons and grandsons of doctors and are here to-day because you have known the life and have liked it. To you, decisions in regard to the future are simple. Among you, however, are many who came into Medicine without having experienced any particular call and who have not yet developed any particular enthusiasm in regard to it. Indeed, I know there are some who have secret doubts about the wisdom of coming into Medicine at all, and who view the future with uncertainty and even dread. It is to you I would speak for a moment for

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I, too, have experienced just such uncertainty.

First of all, I recommend that you postpone any final decision until you have completed an internship and perhaps a spell as a doctor's assistant. This will give you a quick and close-up view of medical practice and let you judge by actual experience whether you like it or not.

After that there are two courses open to you. One of these, and this is rarely necessary, involves getting out of the profession altogether and starting on a new road in life. It is a decision that should, in my opinion, be made only when there is a clear call from some other kind of life. One of my classmates did it, with great courage and with subsequent great success, when he walked out of the General Hospital at the end of his internship and went back to his first love—zoology. He ultimately became a distinguished professor and head of his department. I recall the tough struggle he had with himself before he made his decision, and how relieved and happy he was afterwards.

The second course is the one which will usually solve all difficulties without anything so revolutionary as making a fresh start. It simply involves a calm evaluation of all the kinds of lives that can be lived in Medicine, and then selecting the one to which we are best suited and in which we can be most content.

It is surprising how many different kinds of lives can be based on a course in Medicine. At the table where I usually have my luncheon I frequently meet, in addition to surgeons, two successful general practitioners, two very distinguished internists, a hospital superintendent, the General Secretary of the Canadian Medical Association, the Medical Director of one of the insurance companies, the Director of the Canadian Red Cross, and half a dozen different kinds of specialists. Every day I meet doctors who have found happiness in research and in teaching the Basic Medical Sciences. Some of them, as you very well know, have achieved world renown.

I do not wish to emphasize distinction and renown at this stage, however, as these are things which come only as a result of long and faithful pursuit of an ideal and the generous assistance of Lady Luck. I wish to emphasize, rather, the opportunity there is in Medicine for a good life, a successful life and a happy life, for almost every kind of individual who is graduating here to-day.

Among you are some who will make the ideal family doctor and who by a traditional combination of science, culture and love of his fellow man will make for himself such a place in the community and in the hearts of his patients that he will be able to look back, when the shadows are growing longer and view with pride and satisfaction a life of work well done. There is, I think, no more thoroughly useful and happier life than that of the family doctor.

Among you, too, are some in whom executive ability, business acumen and perhaps political sagacity are outstanding characteristics. To you I suggest that it might be a pity to waste such natural gifts on practice and that the wiser plan could be to look about for opportunities to make use of them in combination with your medical training. For such men the posts of hospital superintendents, directors of clinics, Deputy Ministers of Health, secretaries of the great medical associations, are all waiting. Half the hospitals in America are looking for doctors who have the

necessary ability and training to make them successful administrators.

And then there is another group, of which I formed one, who will feel the urge to concentrate on smaller fields than the broad fields of general Medicine, in the hope of attaining a higher degree of excellence. This is something which calls for careful thought, for it is so easy to make a mistake. A decision should never be made until one has had a close-up view of general Medicine in an internship or in practice, and an actual try-out in some junior capacity in the specialty under consideration. I wish I felt qualified to advise you more clearly on all these special branches of Medicine but unfortunately I do not. I can speak, however, for Surgery. This is a branch of Medicine which because of its rather spectacular character and because of its supposed easier life and higher financial rewards, is attracting large numbers of each graduating year. It happens too, that here in Toronto we have a group of brilliant young surgeons who naturally attract the admiration of the students. But just here let me suggest that you pause and think this matter over with the utmost care. In the first place, is the urge to go into Surgery sufficiently strong to justify spending the four or five more years that are necessary, after the intern year, in concentrated study, in a form of life that makes ordinary family life impossible, and with practically no financial return? I am not one of those who object to Residents and Assistant Residents being married; indeed, from the experience of the post war years I am inclined to the opinion that it has not interfered with the quality of their work or retarded them in their progress. Yet there isn't any doubt it is tough for a girl to have to live on the income of a house surgeon. In the second place, let me disabuse your minds of the idea that Surgery is an easy road to large financial income. It is only necessary to look up the probates of the wills of the surgeons who hâve died in the past ten years to see that wealth is not one of their rewards. The surgeon is usually 30 to 35 years old before he begins to pay expenses and at 60 or thereabouts, if he hasn't died of a coronary or a stroke, his gradual retirement begins. To this I hardly need to add that after the years of preliminary training are over the practice of Surgery is intensely competitive and that success comes only to those who have natural gifts and special qualifications and who are prepared to give up all notion of limiting themselves to an eight or a ten hour day.

Just one further word of warning. My friends among the physicians are fond of poking fun at us on the ground that we are glorified carpenters or plumbers or face lifters or what not. They have been doing this since the physicians wore the long robe and talked to each other only in Latin, and the surgeons consorted with the barbers. The fact remains, however, that the surgeon must make the decision when an operation is necessary and he alone must take the responsibility when it is undertaken. He must be a man, or a woman, who has the kind of courage that enables him to face serious and desperate situations with equanimity; who, after all necessary study, consultation and reflection can make a final decision and then carry to its ultimate conclusion whatever plan is deemed best. Above all, he must be able to accept responsibility. If he cannot do that without worry and loss of sleep, then duodenal ulcer, hypertension and coronary disease will be his reward instead of the happiness and satisfaction

that the successful surgeon derives from his work. It is not without reason that so many of our successful surgeons wear number 17 collars, have their libraries decorated with cups and medals won on the playing field or in boats, and have represented their country as Rhodes Scholars at Oxford. Still, with all these drawbacks duly considered, I wouldn't trade the life I have led for any I have ever heard of and I can promise you that if you have natural aptitude, a good training and reasonable luck you will find the life of a surgeon a thriller.

The one other branch of Medicine of which I have some knowledge is that of general practice. This is the form of practice in which most of you will spend your lives, so that all that pertains to it will interest you.

It has been said that during the past twenty-five years the standing of the general practitioner has suffered an eclipse and that his place has been taken, to a larger extent, by this or that type of specialist. I have an idea, however, that this period is drawing to a close and that the old time family doctor is coming into his own again. The reason for this is that the family doctor, if he is well trained and if he has certain natural qualifications, is in a much better fundamental position in relation to his patients than any specialist can be. He, for instance, sees his patient at the earliest stage of his disease. Again, he knows his patient personally and is aware of his past history, his psychological peculiarities and above all, of his character. He is, indeed, by far the best person to take care of us when we are sick, if he really is a good doctor. The place of the specialist should be that of a consultant, an expert in some smaller field, to whom the practitioner can turn for advice and to whom he can refer his patient when special care is required.

So, on this graduation day, when both you and I will become doctors, what more important subject can we discuss than how to become really good doctors? This is, of course, a subject with many angles and which can be approached from many viewpoints. I shall limit myself, however, to two, namely, that of the medical school and that of the practitioner.

I am inclined to think that with the enormous increase in the scope of Medicine, Paediatrics, Obstetrics and Surgery and of the Basic Sciences upon which they depend, not enough consideration has been given to the apprenticeship during which the budding practitioner may make practical use of his theoretical training, to a period where he can accept responsibility, under proper supervision, for the care of sick people. It is all very well to know the physiological action of some drug, say digitalis, but it is another thing altogether to prescribe it and to know that the patient is getting the best results from it. It is a simple matter to learn from a textbook all about Colles's Fracture, but it is a very different thing to treat one. More medical reputations have been ruined by a crooked wrist shown at an afternoon bridge party than by anything I know. The truth is the extent and character of the internship has not kept pace with the great expansion of the undergraduate curriculum. An outstanding example of this deficiency is seen in Paediatrics. This is a branch of Medicine which has undergone tremendous development with a corresponding enlargement and improvement of the undergraduate curriculum. Yet, in spite of the fact that probably a third or more of the family doctor's practice has to do with illness in babies and older children, not a

tenth of our graduates ever have an internship in it. It seems to me, therefore, that consideration should be given to enlarging our general internship programme in all our university hospitals and if there are not enough of these, then in additional hospitals, until an adequate internship can be provided for all. I would suggest a basic programme of six months Medicine, six months Obstetrics and Paediatrics and six months on surgical emergencies including fractures. To this might be added, with the utmost advantage, six months or a year with a general practitioner.

To my colleagues on the Faculty I have to suggest that if an eighteen month or two year internship such as I have outlined were organized as a part of the curriculum of all students preparing for licensure it might be possible to transfer a lot of the lecture courses that are crammed into the undergraduate years to the intern years and so, perhaps, shorten the undergraduate course.

But, more important than the medical school in producing good doctors is the conduct of the doctors themselves. It is not necessary for me to tell you that graduation day is only a milestone in the long race you are running. To make a good showing you must continue to be students all your lives, for not only does our knowledge need constant review but we are living in an age of marvellous change in medical science. In the short time that you have been here as students you have seen many of the most lethal bacterial diseases literally wiped out by the sulphonamides, penicillin, and streptomycin. And right now one of the greatest discoveries of all time may be approaching success in the treatment of rheumatoid arthritis.

So, to keep abreast of the times, one must read. It is not enough to depend on textbooks because these very quickly get out of date. One must make sure of access to the current literature and subscribe to as many journals as one can afford and has time to read. It is amazing, as Professor Boyd has probably told you, what a grasp of medical literature one can gain from 15 or 20 minutes reading each day.

Then, one must belong to the Academy of Medicine with its excellent library and its regular scientific meetings, and to our provincial and national associations. It has been my experience, however, that the best results have come from the little clubs to which I have belonged, particularly if the chairman happened to have the gift of leadership. I remember with what delight I found myself, away back in 1906, elected to membership in William Goldie's Reading Club. There I met a representative group of the young members of the faculty who gathered together every fortnight to discuss the material they had extracted from the various journals in the intervening two weeks. Ever since those early days I have been a member of one or two of these little societies and from them I have learned more and received greater stimulation than from any other source. At first these should be local clubs or composed of a membership within easy motoring distance of one another. As time goes on, however, and income increases, the distances may be lengthened to overnight travel by train. In that way one can keep abreast of all the new work that is going on in neighboring cities. These clubs should not have a membership of more than 25 or 30, as it is the intention that when the meetings take place all the members may gather around the operating table or in the experimental laboratory or at the bedside and

talk to one another as the occasion requires.

So, I have to recommend that from the day you begin your internship you develop the habit of forming small groups of kindred spirits for mutual stimulation and benefit. The benefit, of course, comes chiefly from what you put into it yourselves; the stimulation comes from the others. I suggest that you carry on this practice in the city, in the town or in the village in which you may live, for I am convinced that nothing you can do will have more far reaching and beneficial effects than the associations formed in these clubs.

And a third important habit to develop is that of regular visits to appropriate medical centres for the purpose of post-graduate education. By far the best place to go for this refresher, at least in the early days of your practice, is to the hospital where you served your internship. Here you are remembered and are welcome and you know the rules and regulations and the general routine. If you keep up these visits with any regularity you will find yourself accepted as a part of the institution and always welcome in its exercises. Two outstanding examples at the General Hospital are a general practitioner from New Brunswick and a surgeon from Manitoba who come every year for a week or ten days of rejuvenation.

From time to time during visits to rural medical societies I have had to listen to bitter abuse of the medical school and the hospitals for the coldness and indifference with which they are said to treat the graduates. But while these complaints may have had some justification in the past, when very few graduates had internships, they are without foundation to day. Any man or woman who has been an intern in one of our four hospitals is joyfully received when he returns and may be perfectly sure of a welcome.

As one becomes more firmly established in practice, and income increases, it is well to visit other centres, particularly those that have become famous in medical history or which are now producing important work. I will never forget the thrill I got as I stood early one morning in the cathedral in Metz with the sun shining through the beautiful eastern windows and remembered that Ambroise Paré had knelt just there in 1552, nearly four hundred years ago. The same stirring of the emotions comes when you first step into Ether Hall in the Massachusetts General Hospital in Boston, where Morton gave the first anaesthetic. And what a thriller it was, just 25 years ago, when Banting showed me the first dog ever kept alive after the removal of the pancreas. So, even if our short-sighted governments will not allow us to deduct the cost of post-graduate education from our annual income tax return, let us travel anyway, for the good of our patients and the good of our souls.

From time to time there has been some agitation for the establishment here of a postgraduate school with a separate faculty and a hospital in which all the teaching would be for graduates. I doubt the wisdom of this, however, for the examples of such schools that I have seen do not arouse enthusiasm. It seems to me that the principle is wrong, for while the little refresher courses that these schools give may be useful in helping candidates to pass examinations, yet they fail entirely to give a thorough and adequate training. Such training, I am convinced, can only be acquired through the Resident System. To try to make internists or surgeons or any

other kind of specialist by courses of lectures or demonstrations is simply waste of time.

Looking back over the years I cannot help thinking of the crowds of good doctors I have known. Most of them weren't great scholars or profound students or remarkable in any way except that they were all good fellows and strong men. They all had that priceless quality, without which a doctor is not much use, of making their patients feel better the moment they entered the room. They knew everybody in their community and were friends of many. They took part in the social and cultural life that surrounded them and they were equally at home in the house of the rich and the house of the poor. Their incomes were not great for they knew better than any their patients' ability to pay, but I noticed that it was always sufficient to let them live in social equality with those of their cultural class. Not only did they care for their people when they were sick, but they were always their counsellor and friend in all the emergencies of life. While they lived they were beloved by all, and when they died a great sorrow filled the land.

I cannot help drawing your attention to your great good fortune in entering the practice of Medicine at this particular time. While the past fifty years has seen as much advance in medical science as all the rest of time put together, yet I predict that this is nothing compared with what will be seen in the next fifty years. The researches in physics and chemistry and in physiology and biochemistry are advancing by leaps and bounds, and just as surely as in the past they will make themselves felt in Clinical Medicine. My only fear is that the golden age in which we live may be darkened or brought to a close by the crazy political theorists who think that the benefits of modern Medicine can be improved and made available to more of the people by bringing medical practice under the control of the State and hiring the doctors for the work they do. This is a doctrine which we must resist by every means in our power, for you and I know that if ever State Medicine became the law of the land, our glorious profession would lose its charm, the bright young Canadian boys, the adventurers, the men of original ideas, even the sons of doctors, would cease to register in the freshman year, and the graduating classes would soon be composed of men whose only interest was their own social security. We agree that the good offices of the state can be employed in extending better medical services to the poor, to the chronically ill and to those who cannot help themselves, but that in doing so it should change our free and happy profession into a politics-ridden, form-writing servant of a department of the civil service, makes the blood boil. I am perfectly certain that if thirty years ago Medicine had been socialized on one of the plans adopted in Great Britain and New Zealand, Frederick Banting and Charles Best would never have entered Medicine and the diabetics would still be dying of coma, just as they used to do.

I would draw your attention, too, to your good fortune in graduating from this particular school. When I was young the only Canadian school that was known abroad was McGill, and an excellent reputation it had. Now, however, through the quality of our teachers and our graduates, through our great Connaught Laboratories and Department of Medical Research, through the Departments of Basic Medical Sciences and through the Clinical Departments

themselves, Toronto is known all over the world and ranks with the very best schools. Its traditions are forming rapidly and of them we may all be proud.

One last word particularly to those who because of the time served in the Army, because of family responsibilities and other things, must achieve financial independence quickly. Do not succumb too easily to the lure of our great neighbour to the south. Ours is a great and glorious country, more in need of doctors than any English speaking nation. There is here, as I have already said, a finer opportunity for a good life, a successful life and a happy life than anywhere I know. So let us stick to our country in times of peace just as we did in times of war, assured that its future and ours are one and that we are, indeed, the heirs of fortune.

Mr. Chancellor, I am sorry to inflict on you this homely talk of an old professor to his former students. My only excuse is that I may not have an opportunity to speak to them again and they are very dear to me. The honour you have done me in conferring on me the degree of Doctor of Laws is the most thrilling that I have ever experienced. As I listened to the kind things the President said about me I would have blushed, had I not known that in me he recognizes a symbol and that in speaking of me he is thinking of our school. His kind words and the great honour you do me almost lead me to say with Simeon "Nunc dimittis, servum tuum, Domine, in pace." This, however, my wife assures me, is too lugubrious for such a happy occasion, so I will conclude by telling the simple truth, that to-morrow I go fishing.

ON THE VALUE OF ABSTRACTS

Mention has been made in a previous issue of THIS JOURNAL of the value of acquiring the "journal habit". Those who have acquired this valuable custom may have become somewhat alarmed at the enormous number of medical periodicals available for perusal in the Medical Reading Room. It becomes rapidly apparent that it is impossible for the practitioner to digest this mass of material in the time he has available for such pursuits. It is under these circumstances that the abstract presents itself as a possible solution to the problem.

A good abstract presents the important aspects of a clinical or laboratory investigation in a few well-chosen words. Read a few abstracts yourself. If they are good examples of their kind, you will find no waste of words, no wealth of statistical detail, no irrelevant material. To twist a phrase, brevity is the soul of an abstract.

Abstract reading should be considered supplementary to journal reading. An abstract which interests you or provides insufficient detail for your satisfaction should be a signpost directing you to the original article. Use them as a guide to a more profitable "journal habit."

D. I. G.

ABSTRACTS

ANAESTHESIA

Preanaesthetic Hypnosis With Rectal Pentothal in Children. L. C. Mark, L. Fox, E. Burnstein. Anaesthesiology, **10**: 401 405, (July, 1949).

One gram of sodium pentothal per 75 pounds of body weight was administered rectally as a 10% solution. The administration was preceded by the usual preanaesthetic medication, Demerol 10-15 mg. being preferred because it combines an opiate and parasympathetic depressant action. In 15 minutes the child was transferred to the operating room where any of the usual anaesthetic agents might be employed.

A series of 100 children, ages 10 months to 11 years, so treated is presented. Sixty-six per cent were asleep in from 5-15 minutes. The remainder were quiet, placid and submissive. Transfer to the operating room evoked no response in 73% and the remainder were much quieter and less apprehensive than in cases not receiving pentothal.

Induction of anaesthesia was easy, and during operation the pulse remained much closer to physiological limits than in children who had no preanaesthetic hypnosis. There were a few cases of minimal stridor and broncho-spasm, and no postoperative complications.

The desirability of having the child fall asleep preoperatively and awaken postoperatively in his own bed is obvious. He is spared the psychological trauma of seeing the operating room and undergoing terrifying anaesthetic induction. The pentothal may be administered by the nurse attending the child to avoid arousing his suspicions. It is pointed out that the agent does not produce narcosis or anaesthesia but simply hypnosis. Pentothal is the agent of choice because of selective cortical action, rapidity of action, short duration, low toxicity, minimum side effects and ease of administration.

S. Witzel

MEDICINE

The Course of Cirrhosis of the Liver in Patients Treated With Large Doses of Liver Extract Intravenously. E. P. Ralli, et al., Medicine, **28**: 301-330, (Sept., 1949).

This article reports the results of 9 years' observation of 112 patients with cirrhosis of the liver associated in almost all cases with alcoholism. The patients are divided into two groups with similar distribution as to age, sex and nutritional state. Both groups received a nutritious diet—carbohydrate 350-400 Gm., protein 90-140 Gm., fat (average) 120 Gm.

Group I consisting of 44 patients received large doses of thiamine, nicotinic acid, riboflavin, vitamin C and vitamin A orally and intramuscularly, and crude liver extract in doses of 5 to 10 c.c. weekly, intramuscularly. The 68 patients in group II were treated similarly but the liver extract was given in very large doses up to 15 c.c. three times a week intravenously. In group II the liver extract therapy was continued till the patient appeared well and until the serum proteins remained approximately normal for 4-6 months.

Results of the treatment were based on survival data, laboratory determinations, improvement in clinical signs and symptoms, punch biopsies and post-mortem findings.

Of group I patients only 29% were alive at the end of the first year as compared to 65% surviving in group II. At the end of three years, 12% of group I and 48% of group II had survived. At the end of 5 years, 41% of the group II patients were still living.

A large number of graphs in the article show the changes in serum proteins, cholesterol and ascitic fluid in a number of individual cases, and tables giving complete data for all the patients are included.

W. J. D. Cooke

Carboxymethylcellulose as a Colloid Laxative. J. Schultz, American Journal of Digestive Diseases, **16**: 319-322, (Sept., 1949).

The author discusses the use of sodium carboxymethylcellulose in the treatment of a very common complaint, namely chronic constipation.

During a three-year period, effects of this substance were studied in 250 patients picked at random from a general practice. The vast majority were markedly benefited by the daily use of small amounts of this material. It was concluded that it gave promise of important advantages over,and possessed none of the disadvantages of, previously available cathartics.

It is apparently completely non-toxic, tasteless, odourless, and does not interfere with ab-

sorption of essential nutritional elements, or absorb fat-soluble vitamins from the intestinal tract.

It has a marked lubricating property which facilitates defaecation, which may account for the fact that it produces satisfactory results in much smaller dosage than is needed with other colloid laxatives. It produces no roughage to irritate delicate mucosa, so is of particular value in patients with irritable or spastic bowels, and can be used advantageously in cases of haemorrhoids and proctitis.

It does not produce intestinal impaction although administered for many months. In cases of diarrhoea, it has an apparent ability to adsorb irritating toxins from the intestines, and tends to produce normal stools.

R. M. Clark

The So-called Silent Myocardial Infarction. H. R. Hipp, J. M. Behrmann, H. Heyer, Am. Practitioner, **4**: 64-66, (Oct., 1949).

In 150 hospital cases of myocardial infarction, 11 were found to give no history of pain, the diagnosis being confirmed by autopsy. Further, a number of cases were found in which symptoms other than pain were the predominant features. These silent cases fall into 4 categories:

1. Inadequate history such as may be found in psychosis, diabetic acidosis, stupor or neglect by examiner.
2. Failure to recognize sensations other than pain as manifestations of infarction.
3. Surgical conditions or anaesthesia masking the occurrence of pain.

A patient may die during operation or postoperatively and have had an infarct before, during or after operation. In particular, postoperative patients receiving narcotics for other than heart conditions, may have precordial pain masked; for it is well known that pain in one part of the body raises the threshold for pain in another.

4. Dyspnoea and severe congestive failure occurring as the predominant symptoms.

That myocardial infarctions do occur without discernible pain cannot be denied, for many cases have been recorded. The frequency with which the story of chest pain is elicited will vary with the ease with which the history is obtained.

J. I. Leventhal

Syringo-Encephalomyelia. H. D. Kirgis, D. H. Echols, J. Neurosurg., **6**: 368-375, (Sept., 1949).

Syringomyelia, syringobulbia or syringopontia (collectively known as syringo-encephalomyelia) refer to a process of cyst formation within the central nervous system for which no aetiological basis has been established. Cavitation in the cord appears to commence immediately posterior to the central canal and, by the accumulation of fluid presumably by transudation across the cyst wall, tends to extend asymmetrically into the lateral and posterior funiculi and superiorly and inferiorly close to the base of the posterior columns. It is most common in the lower cervical and cervico-thoracic regions.

In the cord, compression is clinically recognizable most typically by hypothermia and hypalgesia of hands and arms. Vibration sense and proprioception are often involved but weakness and paresis are, as a rule, late. Motor dysfunction may be lower motor neurone in some muscle groups and upper in others: flaccid and spastic paralysis respectively.

Syringobulbia and syringopontia present a more inconsistent picture than the cord lesion. Structures close to the floor of the fourth ventricle are most likely to be involved.

Therapeutic measures for cysts are incision and permanent communication with the subarachnoid space to prevent further cavitation. Irradiation alone is unsatisfactory.

A. J. Hudson

OBSTETRICS AND GYNAECOLOGY

The Maternal Circulation in Normal Pregnancy. A. J. Palmer, A. H. C. Walker, J. Obst. Gyn. Brit. Emp., **56**: 537-547, (Aug., 1949).

A new attack on this problem has been made possible by the technique of cardiac catheterization. In this series, 96 women were studied of which 84 were pregnant, 4 had been recently delivered and 8 served as a non-pregnant control group. Pressures and oxygen saturations of the blood in the right auricle and ventricle were studied.

The cardiac output was found to be increased from the third to the seventh months of pregnancy and then fell during the transition from post-partum to non-pregnant state. The authors explain the drop in cardiac output in the seventh month as being due to the effects of posture during the catheterization.

The cardiac index, which is the cardiac output per square metre of body surface, was calculated.

This was found to be high during pregnancy, falling to normal during the last two months. The use of this index is open to question since ordinary tables were used. These tables are accurate only for people possessing a normal body shape.

Right auricular pressure was increased to a maximum by the third month and thereafter fell to normal by the ninth or tenth month. There was a rhythmic fluctuation in this pressure which corresponded with uterine contractions.

Arterio-venous oxygen difference was at its minimum value at the beginning of the pregnancy and within normal limits during the last two months of pregnancy.

Basal metabolic rate was generally slightly raised throughout pregnancy.

These results coincide with clinical findings in pregnant women indicating that they possess a hyperactive circulation which is usually in evidence by the third month of pregnancy. Symptoms of this hyperactive circulation are palpitation, slight exertional dyspnoea, a tendency to faint and sometimes praecordial pain. The most obvious sign, however, is a raised jugular venous pressure.

M. Fier

Menorrhagia of Emotional Origin. J. B. Blaikley, Lancet, **2**: 691-694, (Oct., 1949).

The author points out that psychogenic menorrhagia is very much underrated in most textbooks, and is actually quite a common affection. The importance of recognizing an underlying emotional origin lies first in the possibility of cure by advice, reassurance or even psychotherapy, and second in the avoidance of unnecessary surgery.

The author presents and discusses nine cases of menorrhagia which he believes were definitely of psychogenic origin.

A. Bernstein

PAEDIATRICS

Revascularization of the Brain Through Establishment of a Cervical Arterio-Venous Fistula. C. Beck, C. McKhann, W. D. Belnapp, J. Pediat., **35**: 317-329, (Sept., 1949).

The authors have attempted correction of deficiencies of cerebral circulation in children by production of an anastamosis between the common carotid artery and the internal jugular vein, resulting in redistribution and increase of blood flow to the brain. Results indicate that re-establishment of the blood supply to parts of the brain by arterialization of the venous system is a rational surgical procedure, since such procedures have, for therapeutic purposes, been performed and found to be of benefit in vascular diseases of the extremities of humans. Surgery consists of establishment of a small fistula between the common carotid artery and internal jugular vein, the latter being tied off to prevent blood returning to the heart directly. The arterial blood thus traverses both vein and artery.

Although pulsating exopthalmos might be thought to be a complication, the arterial blood reaching the cavernous sinus does so under such low pressure that this condition does not occur. Further, hypertrophy of venous channels prevents possible rupture of veins. The dangers existing are heart failure resulting from too large a fistula, or thrombosis if too small. If complications ensue, the fistula can be closed.

The patients chosen had those types of organic brain injury ordinarily resulting in gliosis. This condition includes patients showing mental retardation on an anoxic or an arterio-sclerotic basis, organic convulsive disorders and brain injury as a result of vascular occlusion or haemorrhage.

The results of the first four cases showed dramatic improvement in lessening grand mal attacks and general betterment of intelligence, activity and behavior.

J. I. Leventhal

SURGERY

The Results of Medical and Surgical Treatment of Essential Hypertension. M. A. Keith, B. Woolf, A. R. Gilchrist, Brit. Heart J., **11**: 287-295, (July, 1949).

The variability of the course run by essential hypertension in a single individual, and from patient to patient, complicated by nervous, emotional and psychological factors, hinders comparison of the efficacy of surgical with that of medical treatment.

By observing 151 cases (96 treated medically, 55 surgically) under constant conditions, the authors attempted to make a significant comparison of the two methods.

On the basis of age, sex, and severity of disease before treatment (retinal change, renal and cardiac efficiency, symptom severity and diastolic blood pressure), the surgical cases were grouped, and each medical case was assigned as control for the surgical group it most closely matched.

Obesity was found not to affect the course of the disease.

One year after commencement of treatment, symptom severity was reduced far more in surgical than in medical cases, and general well-being was more pronounced. Diastolic blood pressure reduction was greater in the surgical patients by a small but statistically significant amount. Retinal change and cardiac and renal efficiency determinations favoured surgical treatment slightly. The mortality, however, was the same in surgical as in medical treatment for benign hypertension, while in malignant cases, although surgery appeared preferable on the basis of death rate, there was insufficient data for a valid conclusion.

R. TASKER

The Results of Thymectomy in Myasthenia Gravis. Geoffrey Keynes, British Medical Journal, Sept. 17, 1949: 611-616.

The author reports 155 cases of thymectomy over the past seven and one-half years. Of these 120 showed no evidence of tumor and 79% resulted in complete and almost complete remission. Reported series of spontaneous remissions in other hands show between 13% and 31% remissions. Very few of these lasted for two years. Recovery in some operated patients was slow, women sometimes showing relapses at the menstrual periods. Operative mortality was 4.2%, five deaths occurring in the first eighteen days but only five in the next eleven. Most cases coming to operation were in advanced stages but there is insufficient evidence to show that long history or severity of systoms affect post-operative recovery. Thirty-five of this series had thymus tumors and full discussion was left for another article. Operative treatment alone appeared to be unsuccessful but somewhat better if preoperative radiation was employed.

D. J. LEWIS

Vitamin E Therapy in Dupuytren's Contracture. R. A. King, J. Bone and Joint Surgery, **31**: 443, (Aug., 1949).

Successful treatment of Dupuytren's contracture by oral administration of vitamin E was reported by Le Roy Steinberg in 1947. Daily doses of 300 mg. of mixed natural tocopherols (60% alpha tocopherol) were given for a few weeks until maximal effect was obtained.

To investigate this therapy, a trial series of thirteen patients has been studied. Dosage consisted of 300 mg. daily of synthetic alpha tocopherol by mouth for a period of three weeks or until maximal relief was obtained. Two cases were abandoned during the first few days and four cases during the third week. Four patients complained of headache, nausea, fatigue, drowsiness, "singing in the ears", "swelling of the tongue", giddiness, blurred vision, sweating, and other symptoms that made it impossible to continue.

Of the nine patients without complaints, five noted no improvement. One case stated, "the hands feel softer". Another said, "the fingers feel straighter, and the aching has gone". Two insisted that "there is improvement," but were unable to elaborate. In one case that continued full dosage to five weeks, the finger was somewhat straighter and the palmar thickening somewhat softer after two weeks of treatment.

The other twelve cases showed no objective changes and the treatment was abandoned.

T. A. MCLENNAN

Splenectomy—Indications for its Use. Lahey et al: Annals of Surgery, **128**, 363 (Sept. 1948).

Splenectomy serves as treatment for three different disease groups: (1) diseases directly related to the spleen, such as tumors and rupture; (2) the syndrome of hypersplenism, wherein the balance of control between spleen and marrow is upset, such as exists in haemolytic anaemia, panhaemocytopenia, and thrombocytopenia and (3) congestive splenomegaly, such as results from hypertension in the portal system and which may lead to panhaemocytopenia and haemorrhage. Contraindications are the existence of leukaemia, polycythaemia vera, and sickle cell anaemia. Complications arise with: (1) haemorrhage from technical error or hypoprothrombinaemia; (2) thrombosis due to thrombocytosis and (3) infection. The operation itself often proves very difficult. However, the authors emphasiz that with careful selection of cases and early treatment, the results will be satisfactory.

MISS A. I. SCOTT

NEWS AND NOTES

MEDICAL SOCIETY.

Daffydil 1949 has established itself as this year's outstanding campus show. Great credit is certainly due all who contributed to the production in time and talent, but special recognition must go to producer Walt Prendergast and director Gord Cameron. Audience enthusiasm marked the show from its original opening to its equally original closing. Special distinction was earned by the girls' chorus-line for their dance routines. Mention should also be made of the entertaining inter-act features, and of the excellence of many of the new tunes which the show introduced. This year's Daffydil has provided a real challenge for those in charge of production in 1950.

* * *

The Medical Athletic Association has all but completed now, its pre-Christmas activity. The season has been a successful one. Soccer, volleyball, and lacrosse teams, in particular, deserve special commendation for their achievements. Hockey and basketball are just getting under way, but the Faculty is already watching with interest the progress of Medical teams in these loops. The Medical Athletic Association announces that preparations are now being made for the distribution of Medical "M's", and other special awards, early in the new year.

* * *

The Medical Women's Undergraduate Association has also been active this pre-Christmas term. A banquet started activity underway early in the fall, and the girls feel that much has been accomplished since then. Medical Women's Undergraduate teams reached the semi-finals in both softball and basketball this year.

* * *

At a recent meeting of the Medical Arts and Letters Club, Dr. Robert McLure, United Church medical missionary, and authority on Chinese affairs, spoke on "Medical Work in China". Following the occupation of his mission hospital early in the war, Dr. McLure served with the International Red Cross, and as Medical Director of the Friend's Ambulance Unit. Since 1945, he has been primarily concerned with the setting up of new hospitals, and with the rebuilding and refurnishing of old hospitals throughout devastated China. A good turnout heard an enthusiastic address from this outstanding speaker.

* * *

The Medical Society has announced that the Medical Year Book will definitely go ahead as planned. Subscriptions have rapidly climbed to upwards of 400, and advertisers have been prompt to reserve space in the magazine. Those in charge of the publication are currently making another appeal for subscriptions. If you have not yet ordered your copy, you are asked to do so at once. This year, in addition to carrying a pictorial record of the year's activities, the book will include individual photographs of each medical undergraduate.

* * *

At the annual convention of the Canadian Federation of Newman Clubs, held in Kingston, Ontario, recently, Claude MacDonald, Meds 5T1, Toronto, was elected President of the Federal Newman Executive. Mr. MacDonald has been active in Newman Club work for some time and is, at present, President of the Toronto Club.

* * *

CAMSI.

Early in November, President Smith, speaking at the twenty-fifth anniversary dinner of the Ontario Hospital Association, suggested the apprenticeship of medical students to general practitioners during summer vacations. In line with this, Camsi has announced that their Summer Employment Placement Service will again be operating this year. The Executive hopes that it will be possible to publish the lists of available positions earlier than in the past. It is hoped, too, that the number of positions listed can this year be increased.

* * *

With the co-operation of the Canadian Medical Association, Camsi has been able, during the past month, to offer medical undergraduates subscriptions to the CMA Journal at greatly reduced rates.

* * *

Camsi medical movies will resume with the new year.

* * *

FACULTY.

The biennial George Armstrong Peters Prize, for an outstanding contribution to surgical science, has been awarded to Dr. W. G. Bigelow, Fellow in Experimental Surgical Research, for his recent work in the field of vascular surgery.

* * *

The Royal College of Physicians and Surgeons of Canada has announced that Dr. W. Stanley Hartroft, Associate Professor, Banting and Best Department of Medical Research, has been given the inaugural award of the College for an original paper on "Aspects of Experimental Choline Deficiency".

* * *

At a meeting of medical men and lawyers held last year, it was decided that there were many problems of mutual interest to the legal and the medical professions. Accordingly, this year, the Medico-Legal Society of Toronto has been established. It is planned to hold a series of dinner meetings at which problems, important to both professions, can be discussed.

* * *

Late in November, announcement was made, by President Smith, of a $314,000 grant to the University of Toronto for the study of mental health. The grant, the largest to any Canadian University for work in this field, was made by the Provincial Government from federal funds, as part of the Canada National Health scheme. A portion of the grant is to be used for research into the causes and prevention of mental breakdowns. President Smith has mentioned specifically biochemical research in the problem of schizophrenia.

* * *

The Hospital for Sick Children, Toronto, is conducting a drive for $4,000,000, the amount needed to complete work started on the new University Ave. hospital. Contributions can be left at any branch of a chartered bank or sent to the campaign headquarters, Toronto Stock Exchange, 234 Bay St.

* * *

ALUMNI.

At a recent meeting, Dr. T. G. Heaton, Staff Physician in Charge of Tuberculosis, University Health Service, was elected President of the University of Toronto Medical Alumni Association, succeeding Dr. W. A. McTavish. Dr. J. Fowler was elected Secretary-Treasurer.

* * *

Dr. David L. Selby of Toronto, a past Vice-President of the University Medical Alumni Association, has been elected President of the University of Toronto Alumni Association. Dr. Selby is a general medical practitioner, and is assistant medical director of the Imperial Life Assurance Company. He was a lecturer in Pathological Chemistry at the University from 1929 to 1947, and in 1933 was awarded the Reeve Prize for medical research. Dr. Selby succeeds Mr. W. A. Osborne of Galt.

* * *

The Medical Alumni Association assisted the University Alumni Association recently in raising money for the Hart House Tower World War Two Memorial, and for the $200,000 alumni loan, scholarship, and bursary fund which is maintained for University of Toronto undergraduates.

* * *

The Ontario Medical Association sponsored a very successful three-day post-graduate course in Obstetrics and Gynaecology, at Sunnybrook Hospital, late in November.

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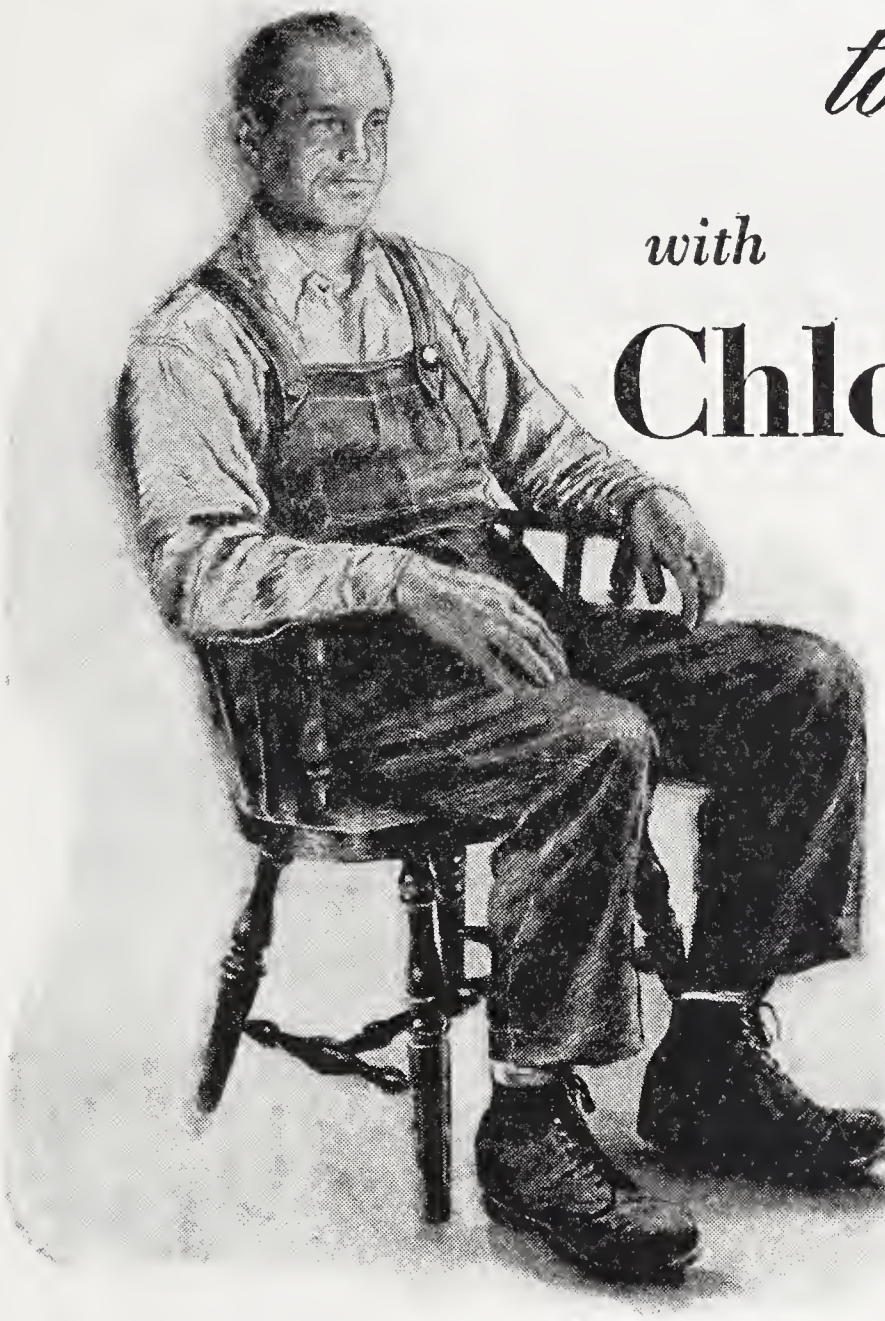

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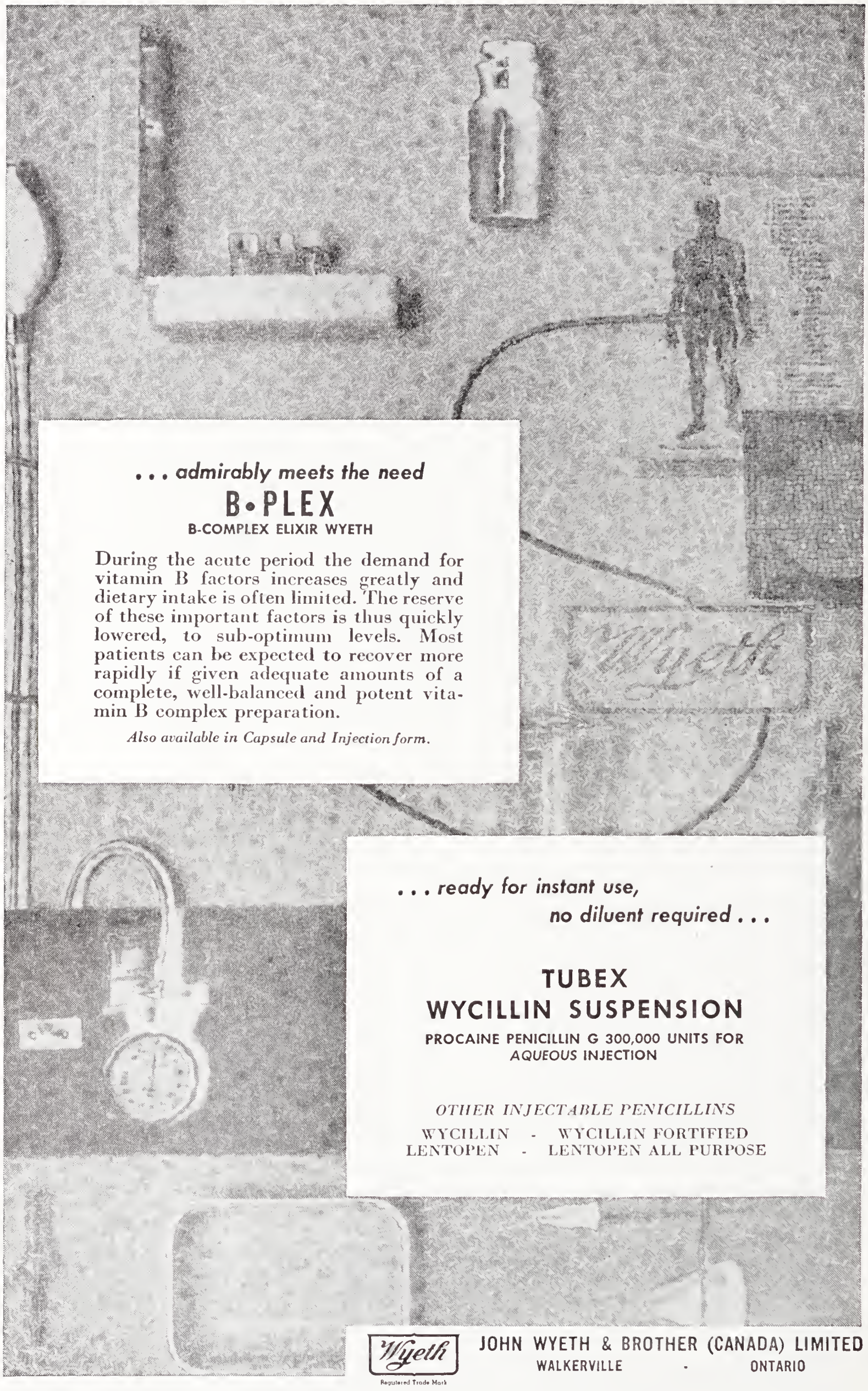

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References:

1. Carliner, P. E., Radman, H. M., and Gay, L. H.: Science, 110:215 (Aug. 26/49). 2. Gay, L. H., and Carliner, P. E.: The Prevention and Treatment of Motion Sickness. Bull, Johns Hopkins Hosp., May 1949. 3. Beeler, J. W., Tillisch, J. H., and Popp, W. C.: Proc. Staff Meet. Mayo Clinic (Sept. 14/49).

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VASOSYLIN

Penicillin and Desoxyephedrine in normal saline, *Will*

INDICATIONS: Rhinitis, nasal congestion, hay fever, sinusitis, common cold and other infections due to organisms known to be sensitive to penicillin.

WHEN PREPARED AS DIRECTED WILL CONTAIN: 5,000 International Units Calcium Penicillin per mil. (cc.)

and

0.125% Desoxyephedrine Hydrochloride in an isotonic normal saline solution.

DIRECTIONS: To be used as a nasal drop or spray.

AVAILABLE in ½ oz. dropper bottle and 2 oz. bottle without dropper.

ETHICAL PHARMACEUTICAL PRODUCTS

CHARLES R. WILL & COMPANY LIMITED

LONDON, CANADA